

# **TS 300 SC-SXC**

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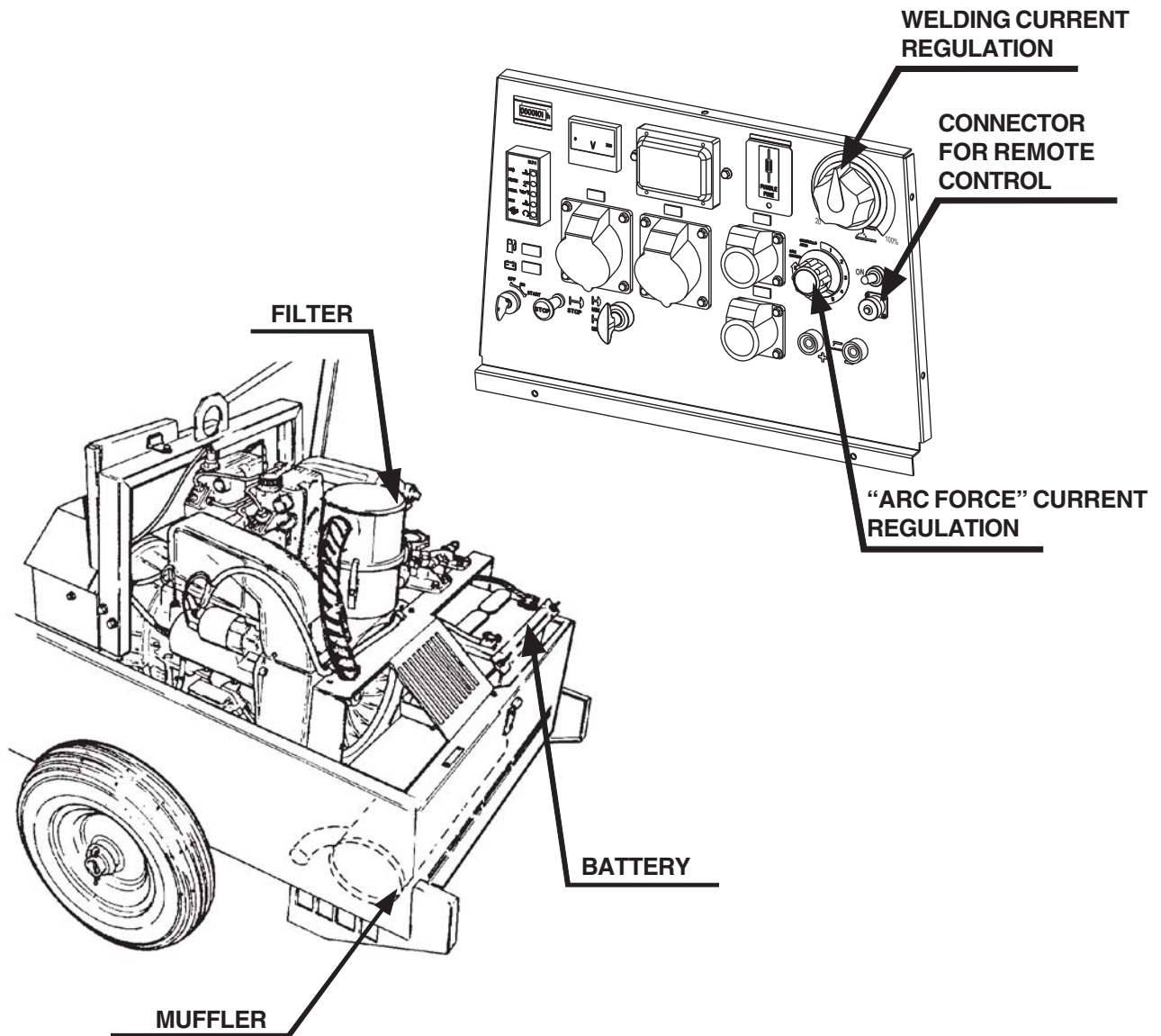
**219829003 - GB**

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

21982M00 29/01/98  
preparato da UPT  
approvato da DITE

**Main Characteristics of the unit:**

- Maximum welding current 300A
- Three-phase power generation 10 kVA / monofase 5 kVA
- Diesel engine LOMBARDINI 12LD477/2
- Noise level at 7m 74 dBA (SC) - 71 dBA (SXC)
- Dimensions / weight: 1320x790x750 / 350 Kg (SC) - 370 Kg (SXC).



The engine driven welder has a base constructed in steel which includes the tank. A cover which is hinged to the roll bar facilitates a rapid check for daily maintenance, while a central hook on the roll bar facilitates the removal or the loading of the machine. The free maintenance battery reduces at minimum the checking of its charge condition. The engine has a low oil and a high temperature protection. Two knobs adjust the welding current, one knob adjusts the effective current; the other one the arc force current.



**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)

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## ATTENTION

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

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

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



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## INFORMATION

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

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

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

- ☞ In case you do not profit on these Services and some parts are replaced, please ask and be sure that are used exclusively original MOSA parts; this to guarantee that the performances and the initial safety prescribed by the norms in force are re-established.
- ☞ **The use of non original spare parts will cancel immediately any guarantee and Technical Service obligation from MOSA.**

## NOTES ABOUT THE MANUAL

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

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

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

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

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

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

## INFORMATION OF GENERAL TYPE

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

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

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

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

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

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

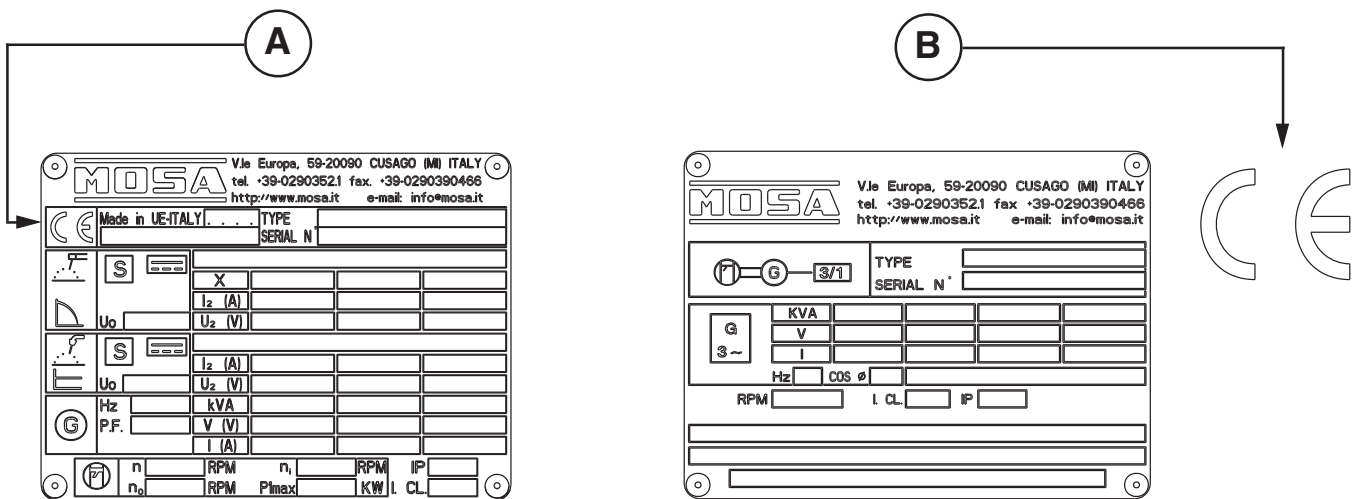




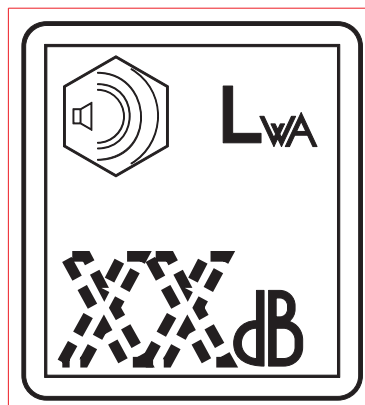
Any of our product is labelled with CE marking attesting its conformity to appliable directives and also the fulfillment of safety requirements of the product itself; the list of these directives is part of the declaration of conformity included in any machine standard equipment.  
 Here below the adopted 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 TS 300 engine driven welder is a unit which ensures the function as:

- a) a current source for arc welding
- b) a current source for the auxiliary power generation

It 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	TS 300 SC	TS 300 SXC
<b>ALTERNATOR</b>	self-excited, self-regulated, brushless	
Type	Three-phase, asynchronous	
Insulating class	H	
<b>A.C. GENERATORA.</b>		
Three-phase generation	10 kVA / 400 V / 14.4 A	
Single-phase generation	5 kVA / 230 V / 21.7 A	
Single-phase generation	2.5 kVA / 110 V / 22.7 A	
Single-phase generation	5 kVA / 48 V / 104 A	
Frequency	50 Hz	
Service	100 %	
<b>ENGINE</b>		
Mark / Model	LOMBARDINI/12LD477/2	
Type / Cooling system	Diesel 4-Stroke / Air	
Cylinders / Displacement	2 / 954 cm <sup>3</sup>	
Net output	14.9 kW (20.3 HP)	
Speed	3000 rpm	
Fuel consumption (welder 60%)	2.5 l/h	
Engine oil capacity	3 l	
Starter	Electric	
<b>GENERAL SPECIFICATIONS</b>		
Battery	12V - 45Ah	
Tank capacity	23 l	
Running time (welder 60%)	9.2 h	
Protection	IP 23	
Dimensions / max. (LxIhx in mm)	1320x790x750	
Dimensions with CTM	1630x920x930	
Dimensions with CTL	2050x980x990	
Weight	350 Kg	370 Kg
Weight with CTM	370 Kg	390 Kg
Weight with CTL	410 Kg	440 Kg
Acoustic power LwA (pression LpA)	99 dB(A) (74 dB(A) @ 7m)	-
Measured acoustic power LwA (pression LpA) -		96 dB(A)(71 dB(A) @ 7m)
Guaranteed acoustic power LwA (pression LpA)-		97 dB(A)(72 dB(A) @ 7m)

#### POWER

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

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 (L<sub>WA</sub>) - 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 (L<sub>p</sub>) - 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 (L<sub>p</sub>) at different distances from a machine with Acoustic Noise Level (L<sub>WA</sub>) of 95 dB(A)

L<sub>p</sub> a 1 meter = 95 dB(A) - 8 dB(A) = 87 dB(A)

L<sub>p</sub> a 4 meters = 95 dB(A) - 20 dB(A) = 75 dB(A)

L<sub>p</sub> a 7 meters = 95 dB(A) - 25 dB(A) = 70 dB(A)

L<sub>p</sub> 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.



**Technical data**

**TS 300 SC**

**TS 300 SXC**

**D.C. WELDING C.C.**

Welding current regulation (I Scale)

20 - 300 A

Service

300 A - 60%, 250 A - 100%

Regulation of welding \*

0 - 9

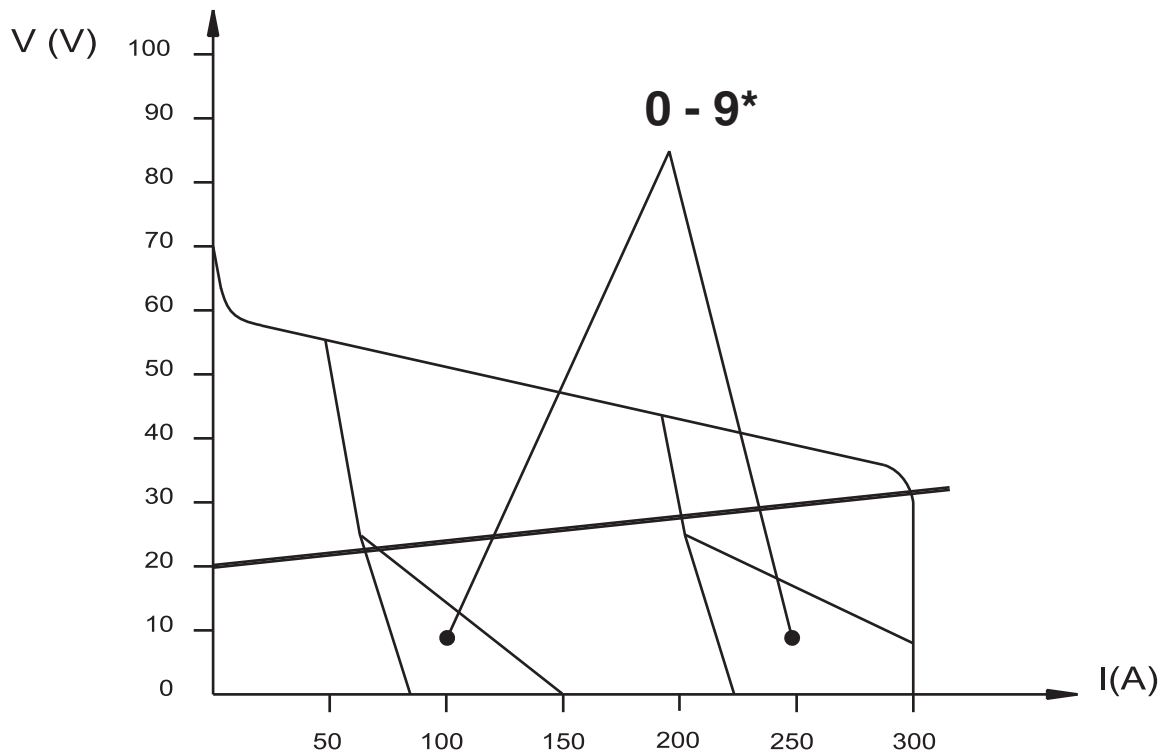
Open circuit voltage

70 V

Welding voltage

20 - 32 V

**OUTPUT CHARACTERISTIC**



Welding current regulator position approx. current values	%	0	25	50	75	100
	A	20	80	150	240	300

**SIMULTANEOUS UTILIZATION FACTORS**

In case **Welding** and **Generation** can be used simultaneously, however, the engine **cannot** be overloaded. The table below gives the maximum limits to be respected:

WELDING CURRENT	>170 A	130 A	80 A	0 A
AUXILIARY POWER	0	2.5 kVA	5 kVA	10 kVA

## 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>WARNING</b>	<p><b>THE MACHINE MUST NOT BE USED IN AREAS WITH EXPLOSIVE ATMOSPHERE</b></p>
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**INSTALLATION AND ADVICE BEFORE USE**

The operator of the welder is responsible for the security of the people who work with the welder and for those in the vicinity.

The security measures must satisfy the rules and regulations for engine driven welders.

The information given below is in addition to the local security norms.

Estimate possible electromagnetic problems in the work area taking into account the following indications.

1. Telephonic wirings and/or of communication, check wirings and so on, in the immediate vicinity.
2. Radio and television receptors and transmettors.
3. Computer and other checking devices.
4. Critical devices for safety and/or for industrial checks.
5. Peapol who, for instance, use pace-maker, hearing-aid for deaf or something and else.
6. Devices used for rating and measuring.
7. The immunity of other devices in the operation area of the welder. Make sure that other used devices are compatible. If it is the case, provide other additional measures of protection.
8. The daily duration of the welding time.



Make sure that the area is safe before starting any welding operation.

- ▣ Do not touch any bare wires, leads or contacts as they may be live and there is danger of electric shock which can cause death or serious burns. The electrode and welding cables, etc. are live when the unit is operating.
- ▣ Do not touch any electrical parts or the electrode while standing in water or with wet hands, feet or clothes.
- ▣ Insulate yourself from the work surface while welding. Use carpets or other insulating materials to avoid physical contact with the work surface and the floor.
- ▣ Always wear dry, insulating gloves, without holes, and body protection.
- ▣ Do not wind cables around the body.
- ▣ Use ear protections if the noise level is high.
- ▣ Keep flammable material away from the welding area.
- ▣ Do not weld on containers which contain flammable material.
- ▣ Do not weld near refuelling areas.
- ▣ Do not weld on easily flammable surfaces.
- ▣ Do not use the welder to defrost (thaw) pipes.
- ▣ Remove the electrode from the electrode holder, when not welding.
- ▣ Avoid inhaling fumes by providing a ventilation system or, if not possible, use an approved air breather.
- ▣ Do not work in closed areas where there is no fresh air flow.
- ▣ Protect face and eyes (protective mask with suitable dark lens and side screens), ears and body (non-flammable protective clothers).



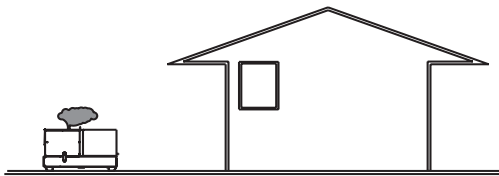
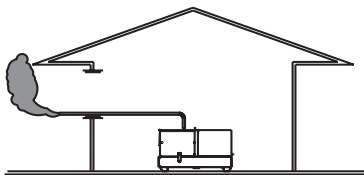
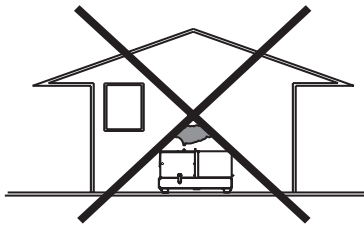
**INSTALLATION AND ADVICE BEFORE USE**

**GASOLINE ENGINES**

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

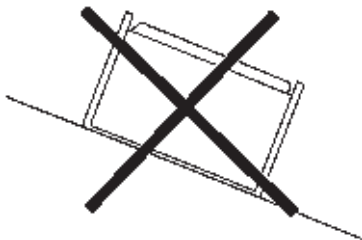
**DIESEL ENGINES**

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

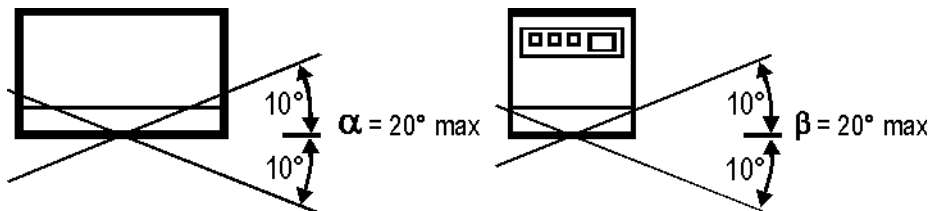


**POSITION**

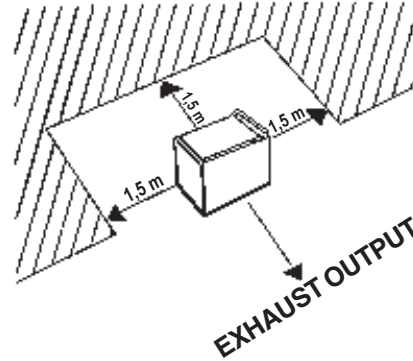
Place the machine on a level surface at a distance of at least 1,5 m from buildings or other plants.



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.

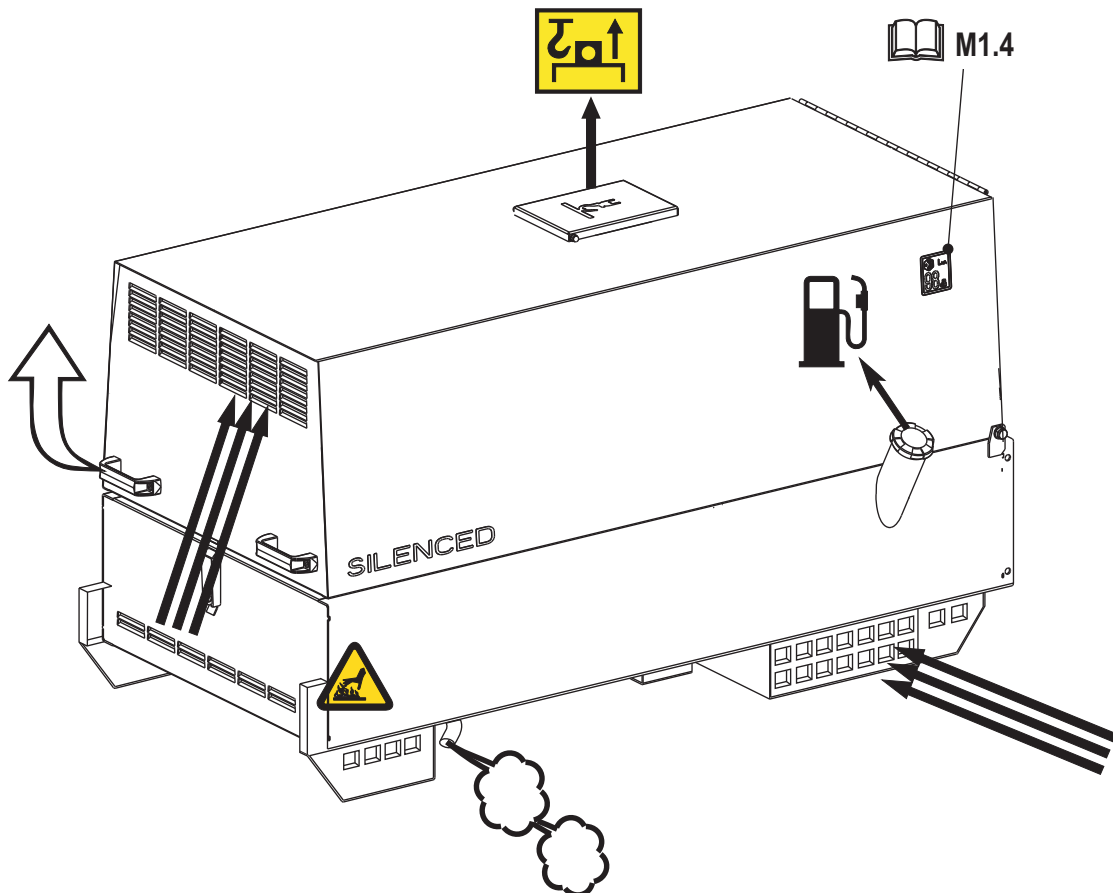
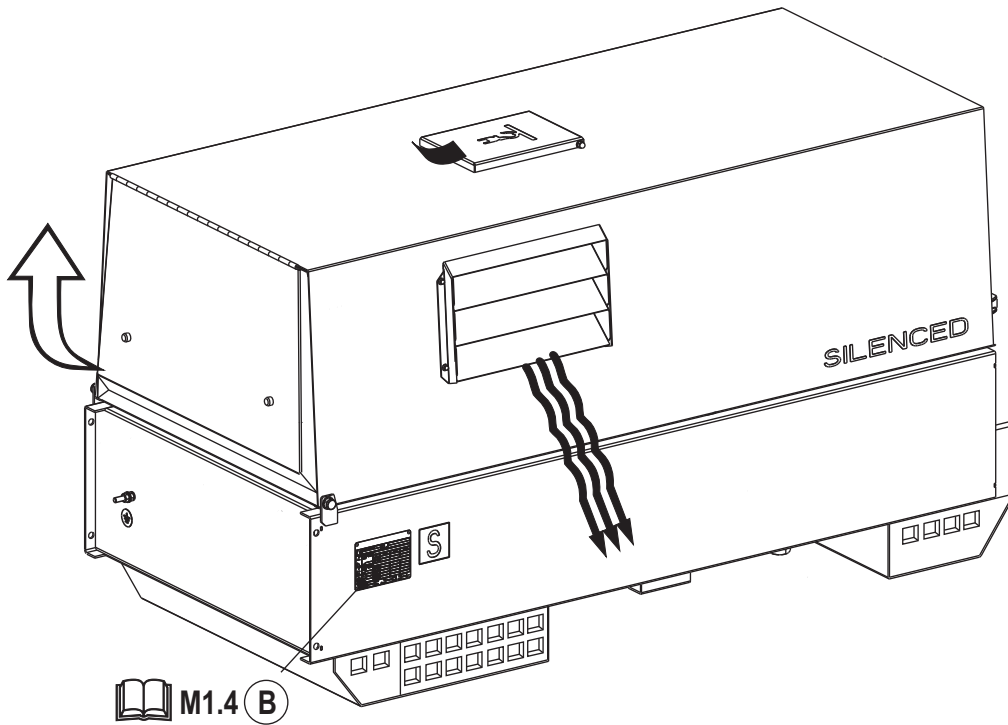
**MOVES OF THE MACHINE**

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

**PLACE OF THE MACHINE**

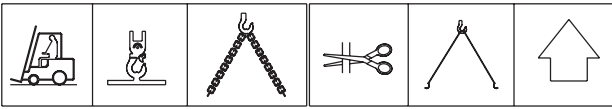
	<b>ATTENTION</b>
	For a safer use from the operator <b>DO NOT</b> fit the machine in locations with high risk of flood.
	Please do not use the machine in weather conditions which are beyond IP protection shown both in the data plate and on page named "technical data" in this same manual.







**NOTE**



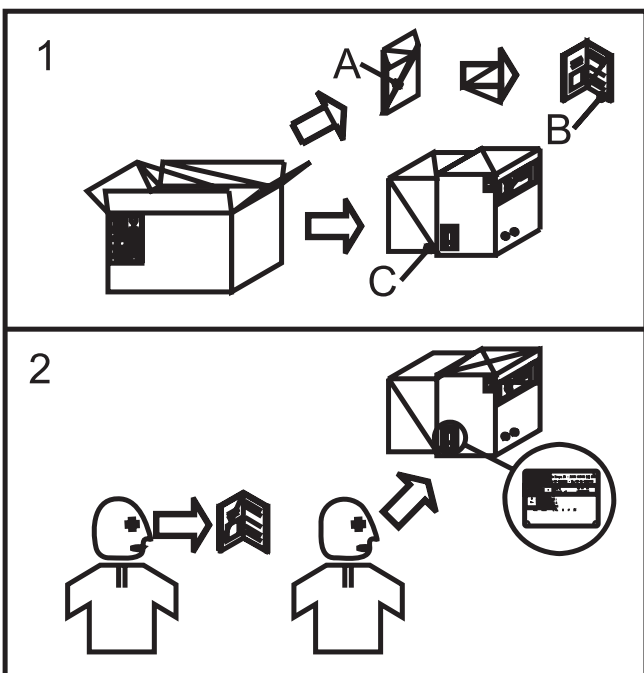
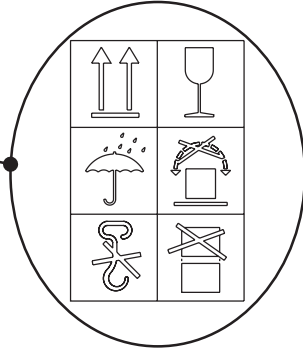
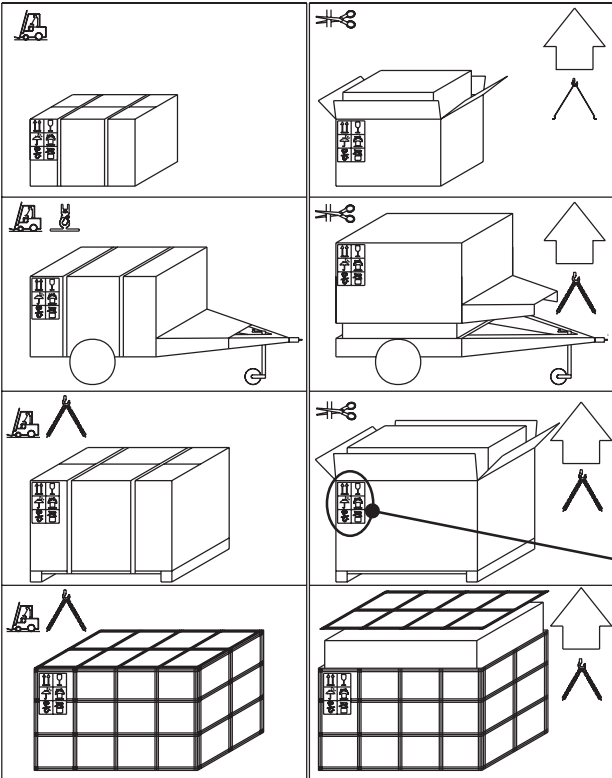
Be sure that the lifting devices are: correctly mounted, adequate for the weight of the machine with its packaging, and conforms to local rules and regulations.

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.

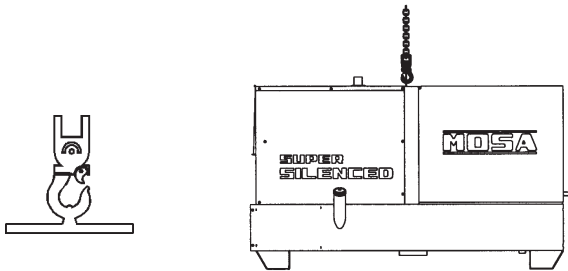
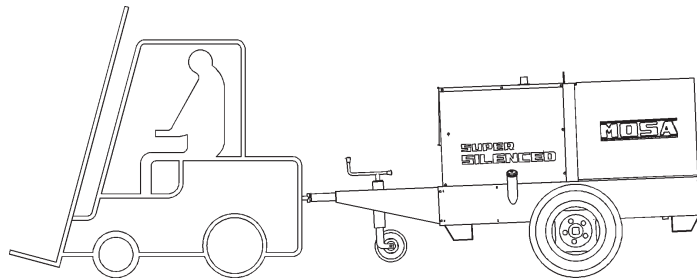
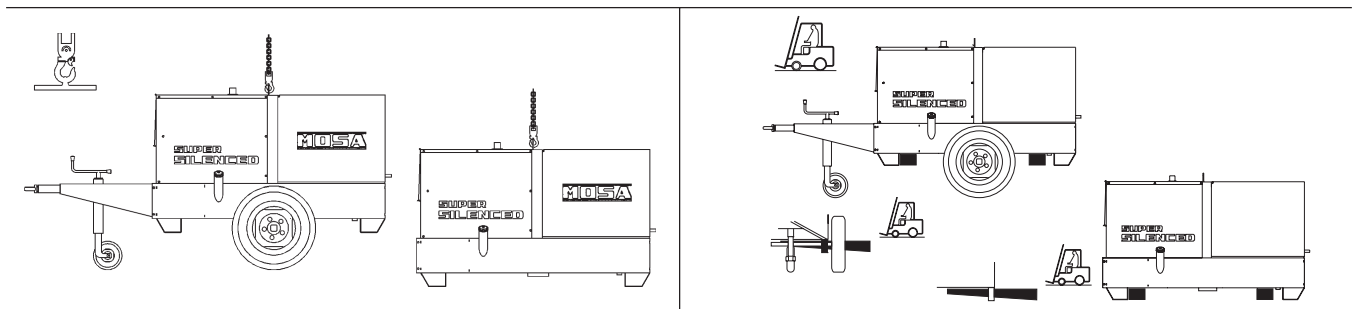
Be sure that the lifting devices are: correctly mounted, adequate for the weight of the machine with it's packaging, and conform to local rules and regulations.

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

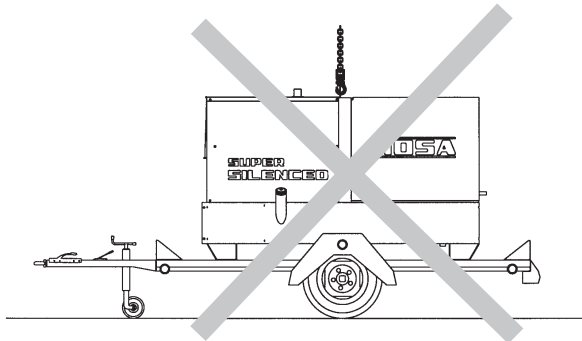
**DO NOT LOAD OTHER PARTS WHICH CAN MODIFY WEIGHT AND BARICENTER POSITION.**

**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.

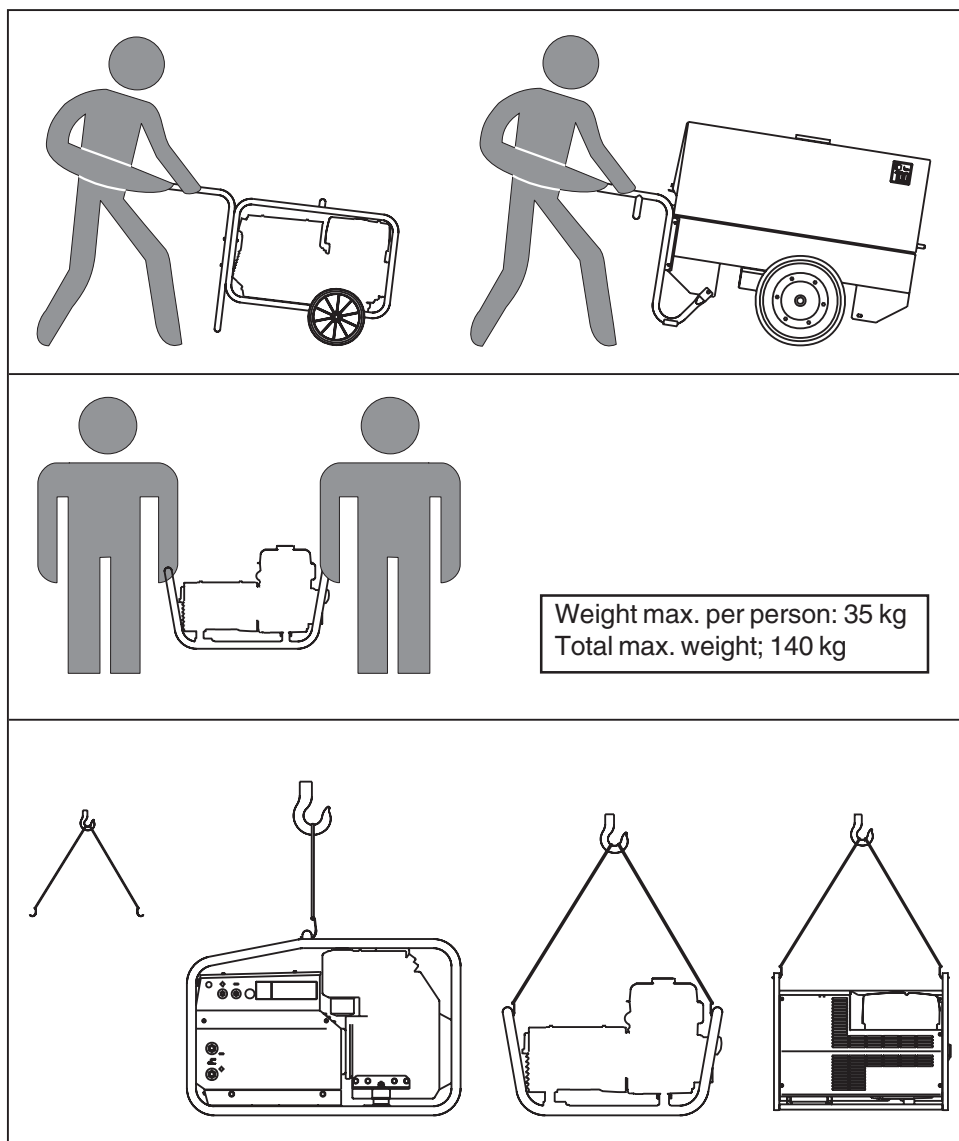
Be sure that the lifting devices are: correctly mounted, adequate for the weight of the machine with it's packaging, and conform to local rules and regulations.

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**

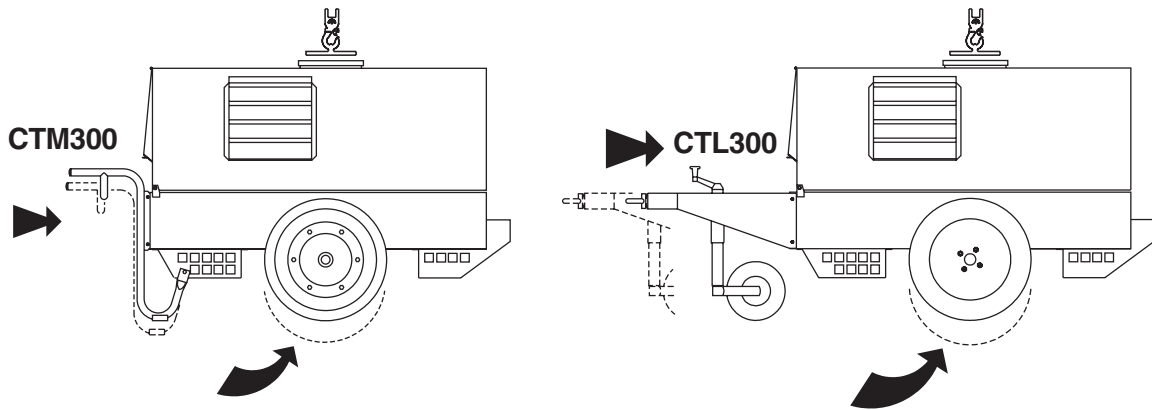
The CTL or CTM accessory cannot be removed from the machine and used separately (actioned manually or following vehicles) for the transport of loads or anyway for used different from the machine movements.

**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.

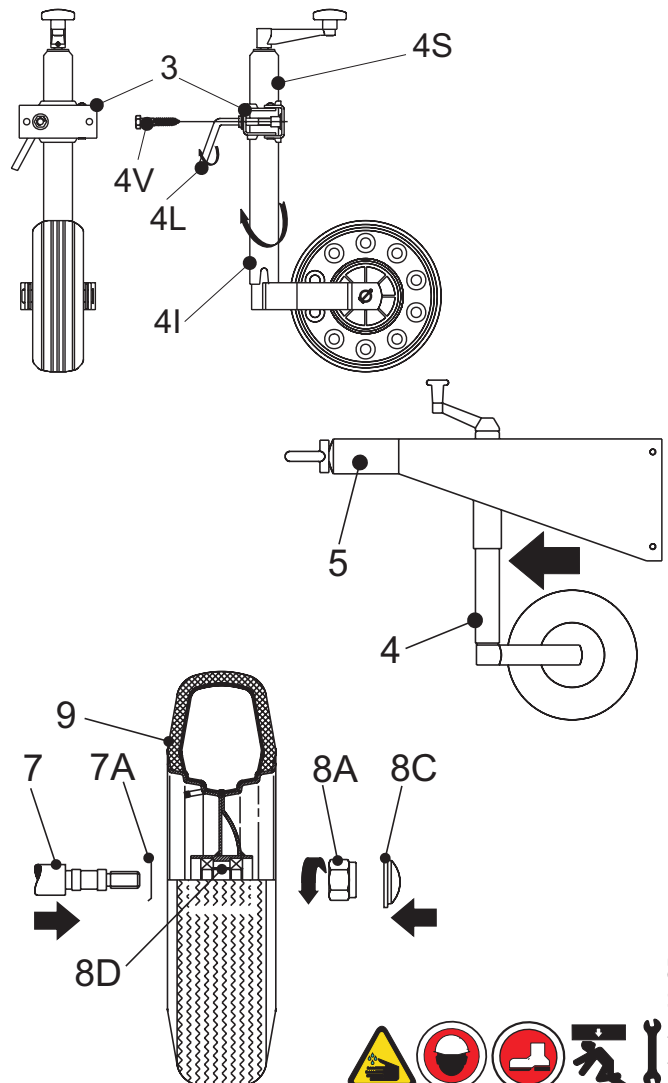
Towing on public roads or turnpikes of any type **IS EXCLUDED**, because **not** in possession of the requirements by national and foreign traffic norms.

**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 RECOMMENDED PRODUCTS	
<b>AGIP</b> SUPERDIESEL 15W/40 API CF4-SG	OLIO MOTORE DIESEL DIESEL ENGINE OIL
<b>AGIP</b> SUPERMOTOROIL 20W/50 API CC-SF	OLIO MOTORE BENZINA GASOLINE ENGINE OIL
<b>AGIP</b> ANTIFREEZE EXTRA INIBITE ETHYLENE GLYCOL (50% + 50% H <sub>2</sub> O)	CIRCUITO DI RAFFREDDAMENTO COOLING CIRCUIT (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 daily



**NOTE**

*Do not alter the primary conditions of regulation and do not touch the sealed parts.*

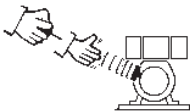
**ENGINES WITH MANUAL RECOIL**



Hold the starting handle firmly.



Pull the rope hard and fast. Pull it all the way out. Use two hands if necessary.

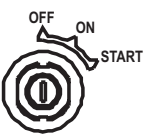


Then returning it slowly.

**ENGINES WITH ACCELERATOR LEVER**

Make sure that the accelerator lever or the switch (16) is at its minimum setting.

Insert the electric protection device (D-Z2-N2) lever towards above and, where mounted, check the isolation monitor (A3) see page M37 –



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 personnel.**

Once the engine has started leave it running at a reduced speed for some minutes.

Accelerate the engine at max., set lever on maximum position and then take up load.

**ENGINES WITHOUT ACCELERATOR LEVER**

Insert the electric protection device (D-Z2-N2) lever towards above and, where mounted, check the isolation monitor (A3) see page M37 –



Introduce the key (Q1), turn it clockwise completely, leaving it as soon as the engine starts.

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

Let the engine run for some minutes before drawing the load.

Open the fuel cock (where it is assembled).



**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.*



**NOTE**

*The machines with E.P. 1 engine protection device (D1), use the accelerator lever ONLY IN EMERGENCY when the engine protection does not work. In this case turn immediately to our Authorized Assistance Centers.*

**ENGINE WITH PREHEATING GLOW PLUGS**

Turn the starter key (Q1) on the position „preheating glow plugs“ (the glow plugs light will be on I4), when the light is off, turn the starter key completely clockwise until the engine begins to fire.

Let the engine run for some minutes before drawing the load.

**ENGINES WITH R.P.M. ELECTRONIC ADJUSTER (ONLY FOR GENERATING SET)**

Turn the starter key (Q1) completely clockwise until the engine begins to fire.

☞ Wait for the AUTOMATIC preheating time before drawing the load

**OCCASIONAL USE OF THE ENGINE**

Using the engine in special conditions which need an immediate intervention, such as emergency plants, etc., use advise to use our Engine Assistance Centres for specific interventions or our Technical Assistance Service.

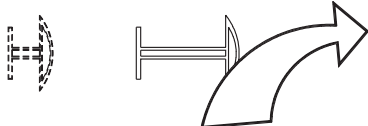
**CAUTION**

If the engine fails to start, do not insist for at least 15 seconds.

*Space the further operations waiting for at least 4 minutes.*

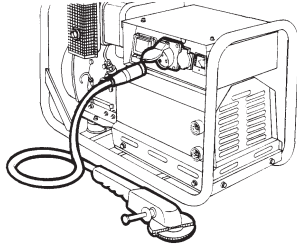
**CAUTION****MACHINE WITH EMERGENCY BUTTON**

Before starting the engine, make sure that the emergency button (32B) is off (turn the button clockwise for this operation)

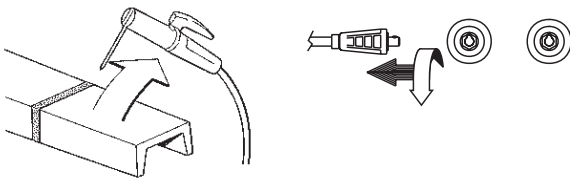
**CAUTION****RUNNING-IN**

*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, please follow the instructions on the engine use and maintenance manual..*

☞ Before stopping the engine **it is compulsory** to effect the following operations:  
- stop to draw three/single-phase current from the auxiliary sockets.



- stop to draw power from the welding sockets (only for TS models).



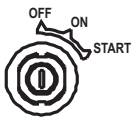
**ENGINES WITH ACCELERATOR LEVER**

☞ Make sure that the unit is not supplying any power.

Disconnect the electrical protection device (D-Z2-N2) lever downward.

Set the accelerator lever or the switch (16) to minimum position and wait for a few minutes to allow the engine to cool, anyway follow the instructions contained in the engine manual.

Pull the stop lever (28) until the engine stops (where it is assembled).



Remove the key (Q1) turning it counter clockwise, OFF position, then take it out.

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

**ENGINES WITHOUT ACCELERATOR LEVER**

Make sure that the unit is not supplying any power.

Disconnect the electrical protection device (D-Z2-N2) lever downward.

Let the engine idle for a few minutes.

Press the pushbutton (F3) until the engine stops

(where it is assembled).

Shut the fuel cock (where it is assembled).



Remove the key (Q1) turning it counter clockwise, OFF position, then take it out.

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

**ENGINES WITH R.P.M. ELECTRONIC ADJUSTER (ONLY FOR GENERATING SET)**

Make sure that the unit is not supplying any power.

Disconnect the electrical protection device (D-Z2-N2) lever downward.

Let the engine idle for a few minutes.

Press the pushbutton (F3) until the engine stops (where it is assembled).



Remove the key (Q1) turning it counter clockwise, OFF position, then take it out.

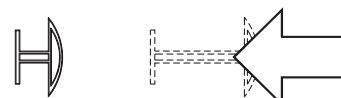
☞ **NB.:** for safety reason the key must be kept by qualified personnel.



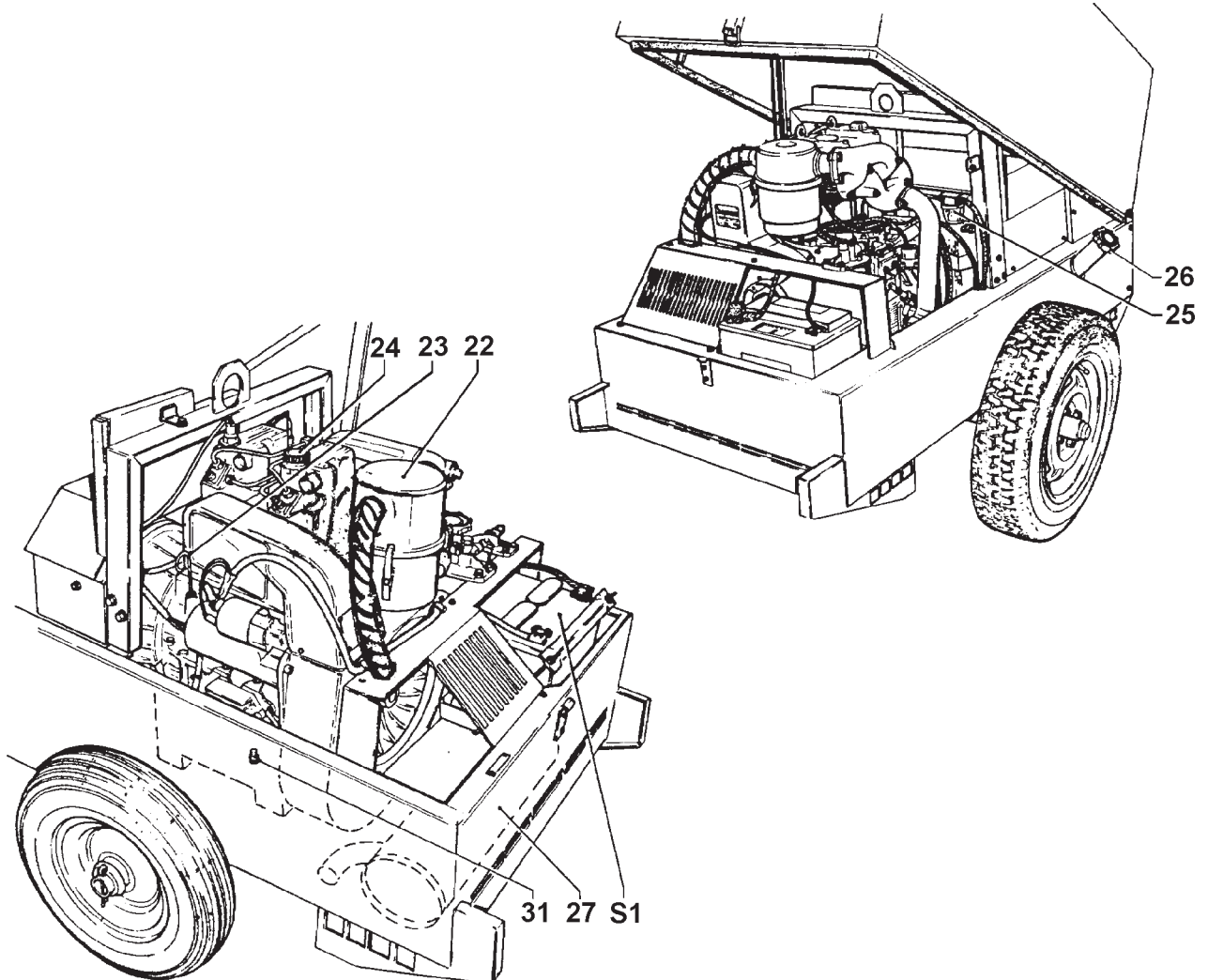
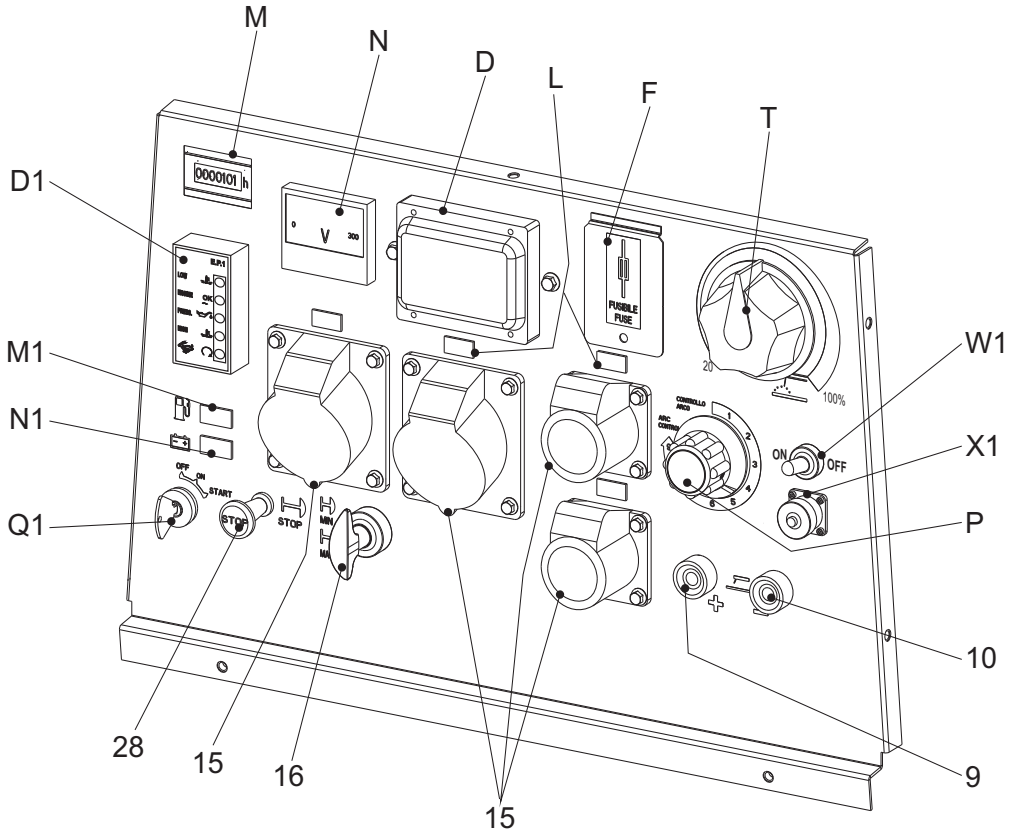
**CAUTION**

**MACHINE WITH EMERGENCY BUTTON**

Pressing it, it allows to stop the engine in any condition (32B) (when assembled).  
To re-establish it, see page M21...



4A	Hydraulic oil level light	A4	Button indicating light 30 I/1' PTO HI	W5	Battery voltmeter
9	Welding socket ( + )	B2	Engine control unit EP2	X1	Remote control socket
10	Welding socket ( - )	B3	E.A.S. connector	Y3	Button indicating light 20 I/1' PTO HI
12	Earth terminal	B4	Exclusion indicating light PTO HI	Y5	Commutator/switch, serial/parallel
15	A.C. socket	B5	Auxiliary current push button	Z2	Thermal-magnetic circuit breaker
16	Accelerator lever	C2	Fuel level light	Z3	Selection push button 20 I/1' PTO HI
17	Feed pump	C3	E.A.S. PCB	Z5	Water temperature indicator
19	48V D.C. socket	C6	Control unit for generating sets QEA		
22	Engine air filter	D	Ground fault interrupter ( 30 mA )		
23	Oil level dipstick	D1	Engine control unit and economiser EP1		
24	Engine oil reservoir cap	D2	Ammeter		
24A	Hydraulic oil reservoir cap	E2	Frequency meter		
24B	Water filling cap	F	Fuse		
25	Fuel prefilter	F3	Stop switch		
26	Fuel tank cap	F5	Warning light, high temperature		
27	Muffler	F6	Arc-Force selector		
28	Stop control	G1	Fuel level transmitter		
29	Engine protection cover	H2	Voltage commutator		
30	Engine cooling/alternator fan belt	H6	Fuel electro pump		
31	Oil drain tap	H8	Engine control unit EP7		
31A	Hydraulic oil drain tap	I2	48V A.C. socket		
31B	Water drain tap	I3	Welding scale switch		
31C	Exhaust tap for tank fuel	I4	Preheating indicator		
32	Button	I5	Y/▲ switch		
33	Start button	I6	Start Local/Remote selector		
34	Booster socket 12V	I8	AUTOIDLE switch		
34A	Booster socket 24V	L	A.C. output indicator		
35	Battery charge fuse	L5	Emergency button		
36	Space for remote control	L6	Choke button		
37	Remote control	M	Hour counter		
42	Space for E.A.S.	M1	Warning level light		
42A	Space for PAC	M2	Contactora		
47	Fuel pump	M5	Engine control unit EP5		
49	Electric start socket	M6	CC/CV switch		
54	Reset button PTO HI	N	Voltmeter		
55	Quick coupling m. PTO HI	N1	Battery charge warning light		
55A	Quick coupling f. PTO HI	N2	Thermal-magnetic circuit breaker/ Ground fault interrupter		
56	Hydraulic oil filter		Pre-heat push-button		
59	Battery charger thermal switch	N5	Connector - wire feeder		
59A	Engine thermal switch	O1	Oil pressure warning light/Oil alert		
59B	Aux current thermal switch	P	Welding arc regulator		
59C	Supply thermal switch wire feeder- 42V	Q1	Starter key		
59D	Pre-heater (spark plug) thermal switch	Q3	Derivation box		
59E	Supply thermal switch oil/water heater	Q4	Battery charge sockets		
		Q7	Welding selector mode		
59F	Electropump thermal switch	R3	Siren		
63	No load voltage control	S	Welding ammeter		
66	Choke control	S1	Battery		
67A	Auxiliary / welding current control	S3	Engine control unit EP4		
68	Cellulosic electrodes control	S6	Wire feeder supply switch		
69A	Voltmeter relay	S7	Plug 230V singlephase		
70	Warning lights	T	Welding current regulator		
71	Selecting knob	T4	Dirty air filter warning light/indicator		
72	Load commut. push button	T5	Earth leakage relay		
73	Starting push button	T7	Analogic instrument V/Hz		
74	Operating mode selector	U	Current transformer		
75	Power on warning light	U3	R.P.M. adjuster		
76	Display	U4	Polarity inverter remote control		
79	Wire connection unit	U5	Release coil		
86	Selector	U7	Engine control unit EP6		
86A	Setting confirmation	V	Welding voltage voltmeter		
87	Fuel valve	V4	Polarity inverter control		
88	Oil syringe	V5	Oil pressure indicator		
A3	Insulation monitoring	W1	Remote control switch		
		W3	Selection push button 30 I/1' PTO HI		





This symbol (Norm EN 60974-1 security standards for arc welders ) signifies that the welder can be used in areas with increased risk of electrical shock.



**ATTENTION**

The sockets, after the machine is started (see pages M21-26), also with no cables, are anyway under voltage.



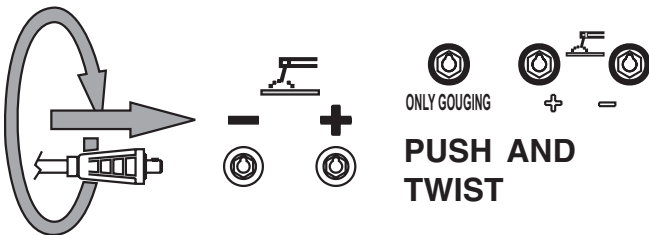
**ATTENTION**

The areas, access of which is forbidden to unqualified personel, are:  
- the control switchboard (front) - the exhaust of the endothermic engine - the welding process.

Check at the beginning of any work the electric parameters and/or the control placed on the front.

Make sure that the ground connection (12) is efficient (keep to installation local rules and/or to national laws), in order to integrate or ensure the working of varius electric protection devices referring to the several distribution system TT/TN/IT, operation unnecessary for machine with isometer.

Fully insert the welding cable plugs into the corresponding sockets ("only gauging", 9+/10-) turning them clockwise to lock them in position.



Make sure that the ground clamp ,whose cable must be connected to the + or - terminal, depending on the type of electrode, makes a good connection and is near to the welding position.

Pay attention to the two polarities of the welding circuit, which must not come in electric contact between themselves.

When using the welder for air arc gouging connect the ground lead to the - socket and the gouging lead to the socket marked "only gouging" (if present).

**MACHINES WITH E.V. PROTECTION**

Accelerate the engine at max. with the accelerator lever (16).See page M 39.

**MACHINE WITH E.P.2 PROTECTION (B2)**

Accelerate the engine at max. with the accelerator lever (16) (when assebled).  
See page M 39

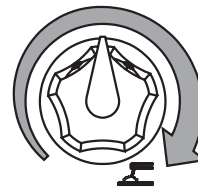
**MACHINE WITH E.P.1 PROTECTION (D1)**

See page M 39.1

**REMOTE CONTROL TC...**

See page M 38

**WELDING CURRENT REGULATOR**



Position welding current adjusting knob (T) in correspondance of the chasen current value, so as to obtain the necessary amperage, taking into acount the diameter and the type of the electrode.  
For technical data see page M52



**ATTENTION**

To reduce the risk of electromagnetic interferences, use the minimum lenght of welding cables and keep them near and down (ex. on the floor).

The welding operations must take place far from any sensitive electronic device.Make sure that the unit is earthed. (see M20 and/or M25). In case the interference should last, adapt further disposition,such as: move the unit, use screened cables, line filters, screen the entire work area. In case the above mentioned operations are non sufficient, please contact our Thechnical Assistance Service.



**CAUTION**

With a welding cable length up to 20 m is suggested a section of 35 mm<sup>2</sup>; with longer cables a bigger section is required.





**MACHINE WITH REDUCTION SCALE SWITCH**



For small electrodes (up to Ø 3.25-130A and 4-200A) it is recommended to use the reduction scale switch (I3) allowing a more accurate regulation of the welding current (lever position at 130 A and/or 200A).

When using electrodes of a diameter greater than 3.25 and/or 4 set the welding scale knob to 100% and/or max. position.

The arc regulator (T) functions equally between both positions (100%-130A and/or 200A).



Protection fuse (when assembled):the fuse protects the electronic welding PCB in case the remote control is short circuited.

**MACHINE WITH O.C.V.**

It permits to choose, according to the work to be done and/or the electrode type used, the best O.C.V.



**MACHINE WITH POLARITY INVERTER**

It permits to have at the electrode holder the positive or negative polarity of the welding diode bridge. It is used above all in the first run with cellulosic electrodes to lower the bath temperature and so doing ease up the welding on pipes of small thickness



**MACHINE WITH BASIC CURRENT "BC"**

Positioning the switch on „ON“, is obtained a low voltage welding current which keeps, always, the lit arc necessary for some types of cellulosic electrodes or when a high penetration is wanted.



For electrodes of basic or rutile type, position the switch on "OFF", the welding current will always remain constant.

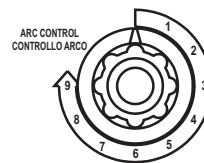
**"CC/CV" MODELS**



These models can be used with electrodes or for TIG welding by selecting the CC (constant current) mode, and with solid wire (MIG, MAG) or flux cored wire selecting the CV (constant voltage) mode. The mode of operation is selected by a switch on the front panel.



**MACHINE WITH ARC CONTROL OR SELECTOR "ARC FORCE"**



Set the welding arc using adjuster knob (P) so as to obtain, for the chosen current value, the best arc characteristic according to the electrode type and to the work to be performed.



On machines with an Arc Force selector, the same result can be obtained by turning the selector "ON" or "OFF". When switched "ON" a base current is applied to the welding current output acting as a sort of "automatic" arc forcing that does not need to be regulated.

For technical data see page M52

At the end of every welding process and/or work, proceed with all the use operations in inverted sense.

To stop the machine see pages M 22-27.

☞ **It is strictly forbidden to connect the group to the public mains a/o to another source of electric power.**

**WARNING**

Sockets are not **self-locked**: tension is available immediately after starting also with no plug.

**WARNING**

The areas, **access** of which is forbidden to unqualified personel, are:  
- the control switchboard (front), the exhaust of the endothermic engine.

☞ At the beginning of every work, check the electric parameters and/or the controls placed on the front.

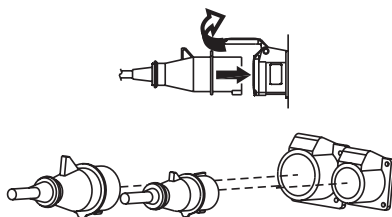
Make sure the unit is properly grounded (12) (where it is assembled).  
- See page M20, 21, 22, 25, 26, 27 -.

Move the accelerator lever (16) and reach the engine maximum speed, except for the engines with constant rpm; the voltmeter (N) (where it is assembled) shows the single-phase voltage whether three or single-phase current has to be drawn.

Nominal voltage	Indicative no-load voltage	
	asynchronous	synchronous (*)
110V	±10%	±5%
230V	±10%	±5%
230V	±10%	±5%
400V	±10%	±5%

\*N.B.: with electronic tens. regul. RVT ±1%

Connect up the machine, using proper plugs and cables in good condition to the AC socket (15) to draw single or three-phase power, or, by cables with adequate section, to the terminal board, placed inside the derivation box (Q3).



The warning light (L), located near the current socket, lights up when the unit can supply alternated current, on condition that the engine is at the maximum rpm.

☞ N.B.: if the warning light does not flash, check the accelerator which must be at its maximum, or the fuse of the relevant socket. (single-phase) or the thermoprotection.

Using several sockets at the same time, the maximum power possible is that indicated on the data plate.

To draw power simultaneously in the TS welder version see page M52.

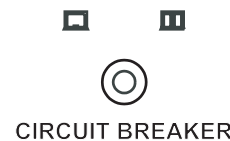
**CAUTION**

The replacement of the fuse must absolutely be done with the engine off (remove the mechanical protection, then shift down the small lever of the fuse holder placed on the front panel).

The max. continuous power of the generating set or the load current must not be exceeded.

**MACHINE WITH THERMOPROTECTION**

If you overload the genset the thermoprotection will automatically switch off. If the thermoprotection is released, disconnect all the connected loads.



Reset the thermoprotection pressing the central pole.

When reset, connect the loads again. In case the protection should act furtherly, check: the connections, the wires or others, and if necessary call the Assistance Service.



Avoid to hold the central pole of the thermoprotection pressed for a long time.

Otherwise, in case of trouble, it will not click, **damaging** the generating set.



**TS ... PL VERSION**

Start the machine and wait for the end of the preheating time imposed by the EP1, EP2, EP5 engine protection device. - See pages M39... - Press the „generation possibility“ push button (B5) placed on the front side of machine.

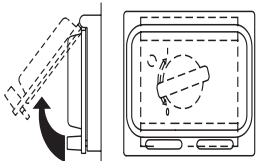
The voltmeter will show the auxiliary voltage which, for machines at 1500/1800 RPM, must. be approx.  $\approx 230V \pm 10\%$  and for machines at 3000/3600 RPM (engine idling) must. be approx.  $\approx 180V \pm 10\%$ .

Push upwards the lever of magnetothermic switch referring to the socket from which load is to be drawn.

**MACHINE WITHOUT PROTECTIVE DEVICE**

In case machine is not equipped with protective device of indirect contacts, by means of automatic breaking of supply, it is **necessary** to put between the load and the generation a differential switch or a similar equipment capable, in any case, to observe the regulations in force CEI 64/8 (and/or successive) Part 4 Par. 4.13.1 and harmonized by directive Nr. 72/23/EEC.

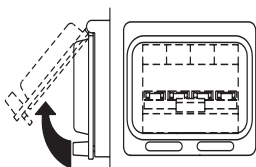
**UNIT FITTED WITH GROUND FAULT INTERRUPTER SWITCH (GFI)**



Turn on the GFI safety-switch (D) by pushing it upwards.

The GFI is a safety device which protects the circuit in the event of a malfunction. In this case the switch disconnects the three and single-phase circuit when in any part of the electric connections a current leakage of more than 30 mA occurs.

**UNIT FITTED WITH THERMAL MAGNETIC BREAKER**

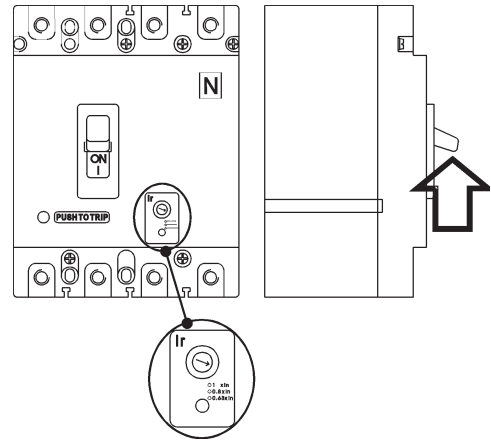


Turn on the thermal magnetic breaker (Z2) by pushing it to the ON position.

The thermal-magnetic breaker is a safety device which protects the circuit in the event of a malfunction. In this case the switch disconnects the three and single-phase circuit when in any part of the electric connections a short circuit or a current absorption occurs above the data specified on the label of the unit.

In the model with setting **DO NOT INTERVENE** on the setting itself. To modify it, please contact our Technical Assistance Service.

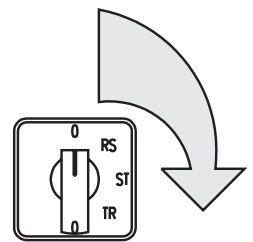
**UNIT FITTED WITH GFI SWITCH THERMAL MAGNETIC BREAKER**



This switch includes the characteristics of both types of breakers (N2).

**UNIT WITH VOLTMETRIC COMMUTATOR (ONLY FOR GENERATING SET)**

**WARNING:** the possible single-phase loads must be correctly divided in the three phases, in order to avoid any possible voltage fall on one phase that results excessively loaded.



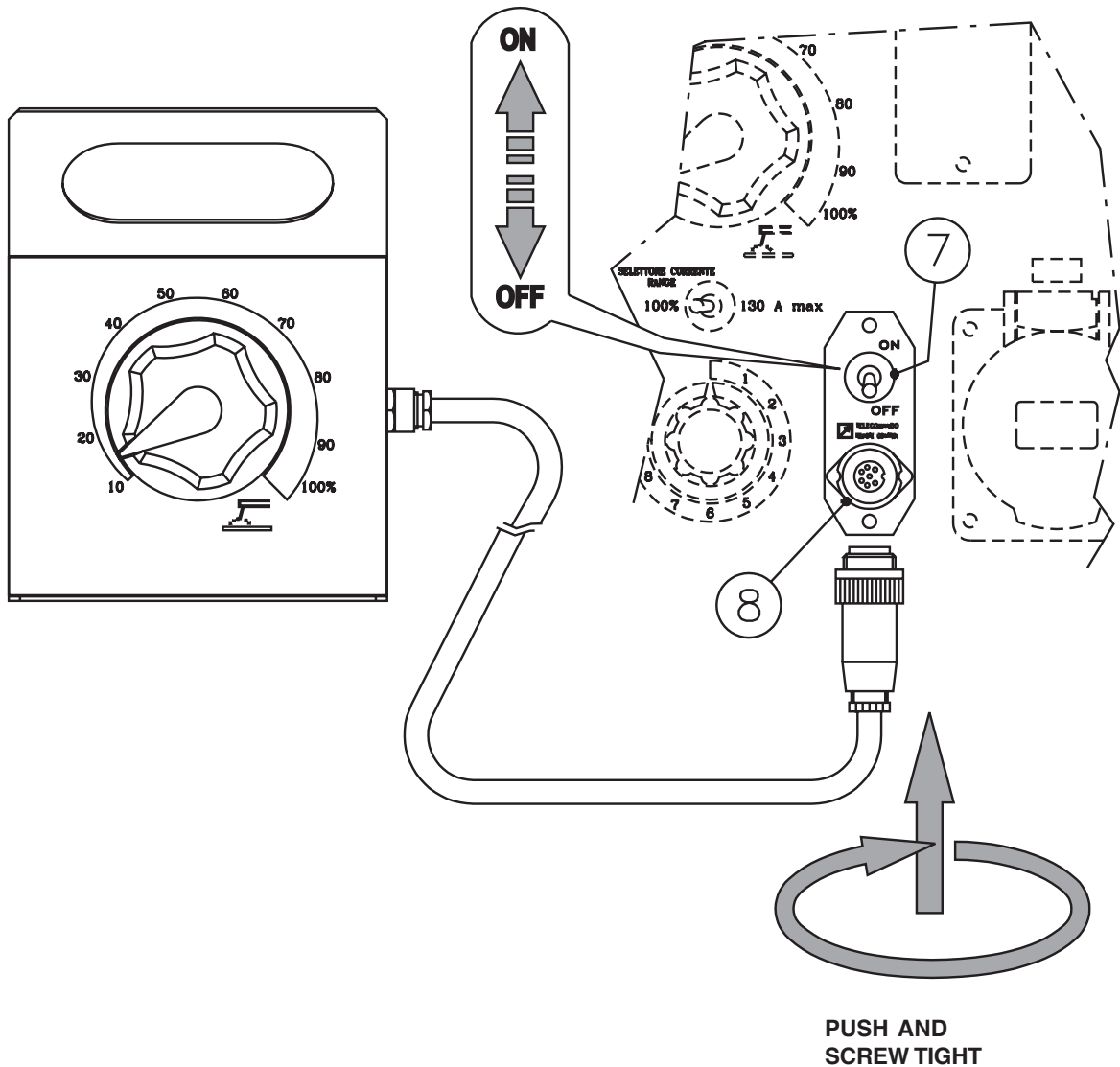
Check the voltages on the various phases with the switch located on the front (H2) and check, reading on the voltmeter (N) about the same voltage value

**N.B.:** in case of overload, it is possible that the engine lowers its speed and the voltage is reduced remarkably. In this case, it is necessary to reduce immediately the load.

**CAUTION**

For machines at 3000/3600 RPM the EP1 safety device will automatically provide to accelerate engine when load is drawn.  
- See page M39.1 -



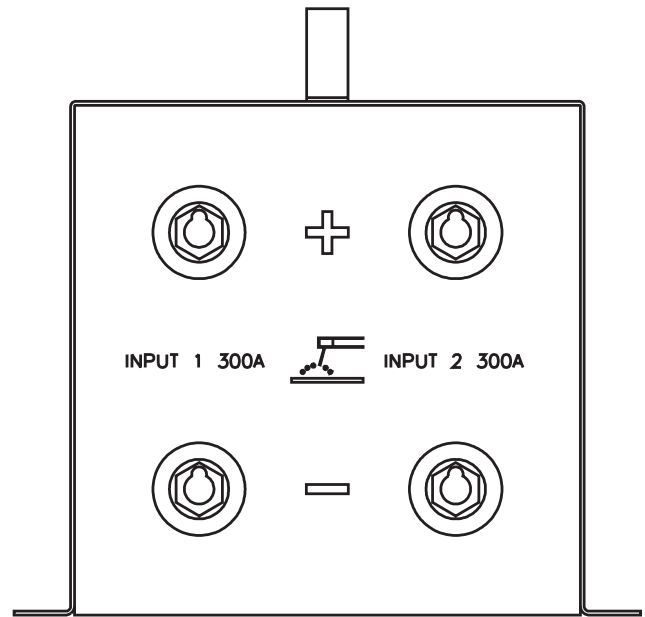
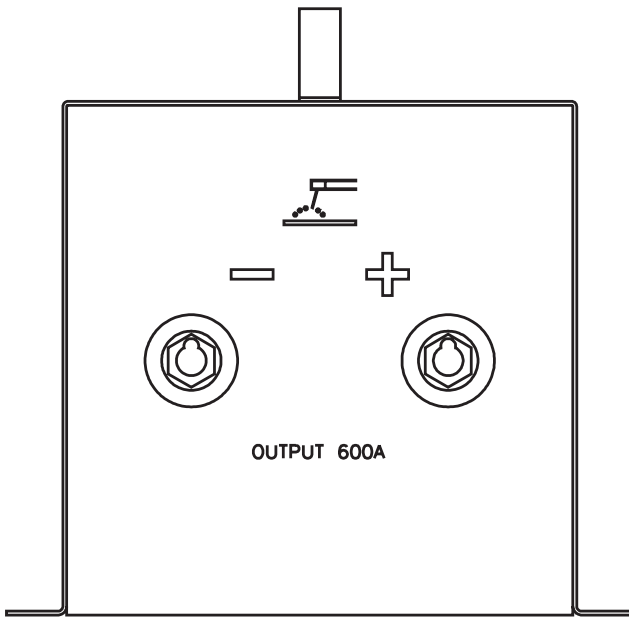


The remote control device for regulating the welding current is connected to the front panel by means of a multipole connector.

To regulate the current from the TC2 / TC2/50, move the switch (7), located above the multipole connector (8), to "ON" position.

Position welding current adjusting (T) knob at the necessary current value for the diameter and type of electrode.

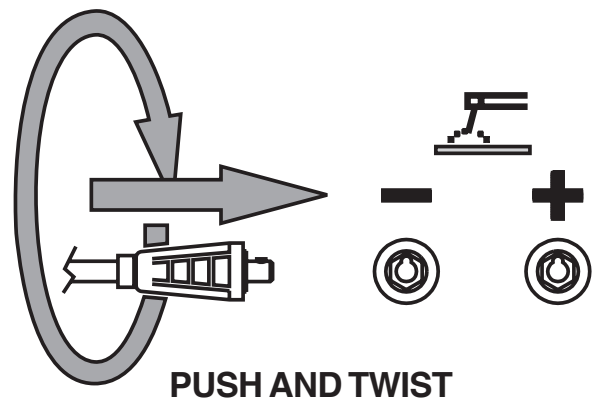
- See page M51 -



The device enables to totalize the welding current of two positions or of two welding machine.

Connect each one of the inputs "+" and "-" of the PAR 600 to each welding position and draw, according to the use, the total current from the "+" and "-" output socket.

Fully insert the welding cable plugs into the corresponding socket (9+/10-) turning them clockwise to lock them in position.



**PUSH AND TWIST**



## MAKE SURE

- 1) the both positions have an identic polarity
  - 2) that O.C.V. have an identic position
- See page M34.2 -

## ENGINE PROTECTION (EP1)

The electronic device EP.1 (D1) is a microprocessor with logic-circuit board that ensures the protection of the engine in case of low oil pressure or engine high temperature.

Located on the front of the machine, the EP.1 enters in operation when the engine has been turned on with the ignition key.

The yellow warning light for low oil temperature (D1.1) will immediately light up; **after** 15 seconds the engine will be checked and if everything is operating normally, the "OK engine" light will switch on.

**CAUTION**

**IN THE FIRST FRACTION OF TIME THE DEVICE DOES NOT MAKE ANY PROTECTION.**

The automatic device requires an engine warning up time of at least 45 seconds, not permitting to draw power when the engine is still cold.

**N.B.:** A longer warning up time (4-5 minutes) is advisable for temperatures below +10°C.

When the warning light (D1.1) goes off, whether the unit is used as welder or as a generator, the green light (D1.5) will light up, the engine will go to maximum speed, permitting to draw power.

Should the oil pressure be insufficient, the red light (D1.3) will light up and the EP.1 device will stop the engine.

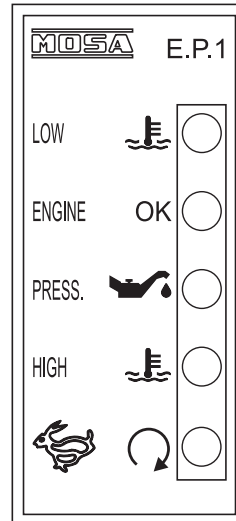
If the temperature rises to dangerous levels, the red light (D1.4) will light up and the engine will stop thus preventing to draw power.

### LIQUID COOLED ENGINE

In case of cooling liquid high temperature, the warning light (D1.4) will light up and the engine will stop thus preventing to draw power.

In this case it is **SUGGESTED** to stop the engine and control the cooling level.

In case of low 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 circuit.



- D1.1(G) Low oil temperature/ Cold engine
- D1.2(V) Engine test/ OK engine
- D1.3(R) Low oil pressure
- D1.4(R) High temperature
- D1.5(V) Engine at maximum

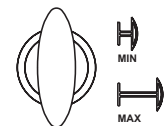
**COLORS**  
G = yellow  
V = green  
R = red

## ENGINE EQUIPPED WITH A MANUAL ACCELERATOR

**NOTE:** This unit is equipped with a manual accelerator for use in the unlikely event that the EP.1 or the accelerator solenoid should fail. This manual accelerator can also be used in cases where the auto-idle function is not suitable for the type of welding being carried out.

**CAUTION:** for machines with EP.1 engine protection: use the accelerator lever **ONLY IN EMERGENCY** when the automatic idle does not work.

Accelerator lever



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

Once the cause of the problem has been removed, to ensure the protection it is sufficient to set the key to zero and restart the engine.

**NOTE**

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

**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.

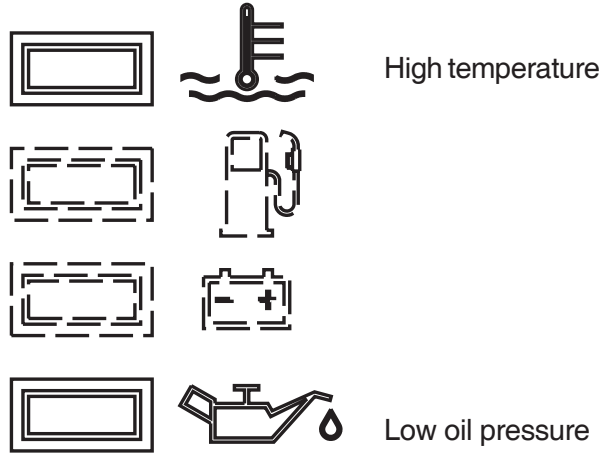
The system consist of electronic card of control and check, and of an engine stop device: solenoid (**ElettroStop**), electrovalve (**ElettroValvola**)

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.*



PROBLEM	POSSIBLE CAUSE	WHAT TO DO
No welding current but auxiliary output is OK	1) Defective diode bridge 2) Problem with welding current control (PCB)	1) Check the diodes of the bridge 2) Is the remote control switch in the internal position? 3) Check the diodes and SCR's of the bridge. 4) Check the transformer which supplies power to the welding control PCB. If it is OK replace the PCB
Weld poorly	1) Defective diode bridge  2) Problem with welding current control (PCB)	1) Check the open circuit welding voltage. If it is OK the diode bridge is OK. If it is 1/3 or 2/3 of the nominal value check the diodes or the SCR's. 2) If the diode bridge is OK replace the PCB.
Intermittently welds poorly	1) Bad connections to welding current PCB  2) Problem with welding current control PCB	1) Check that the pins of the green connectors are clean and making good contact. Check that shunt connections are tight.  2) Replace the welding current control PCB
No welding output and no auxiliary power output	1) Short circuit in wiring  2) Defective condenser  3) Defective stator  4) Short circuited diode bridge	1) Check the wiring inside the welder for a short circuit between cables or to ground.  2) If the wiring is OK, short circuit the condenser to be sure that it is discharged, disconnect all wires from condenser and, using an ohmmeter, check that the condenser is not short circuited.  3) If the condenser box is OK, disconnect all leads from the stator except for those going to the condenser box and check the output from the alternator. If there is no output from the welding winding and the auxiliary winding, replace the stator.  4) If there is output from all windings reconnect the diode bridge and check if there is welding current. If not the diode bridge is defective. If there is welding current connect the auxiliary power leads one at a time until there is no output; at this point, the short circuit is in that line.

[ . ] only for models with electronic control of welding current.



## 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.



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.

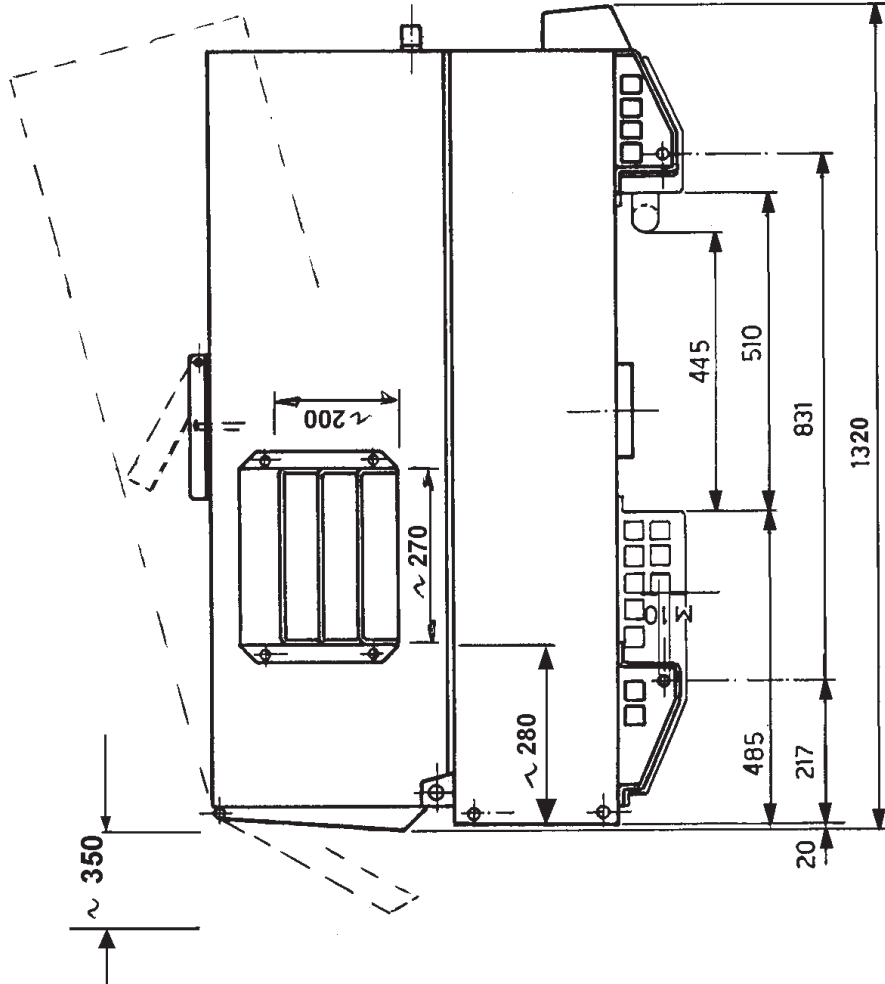
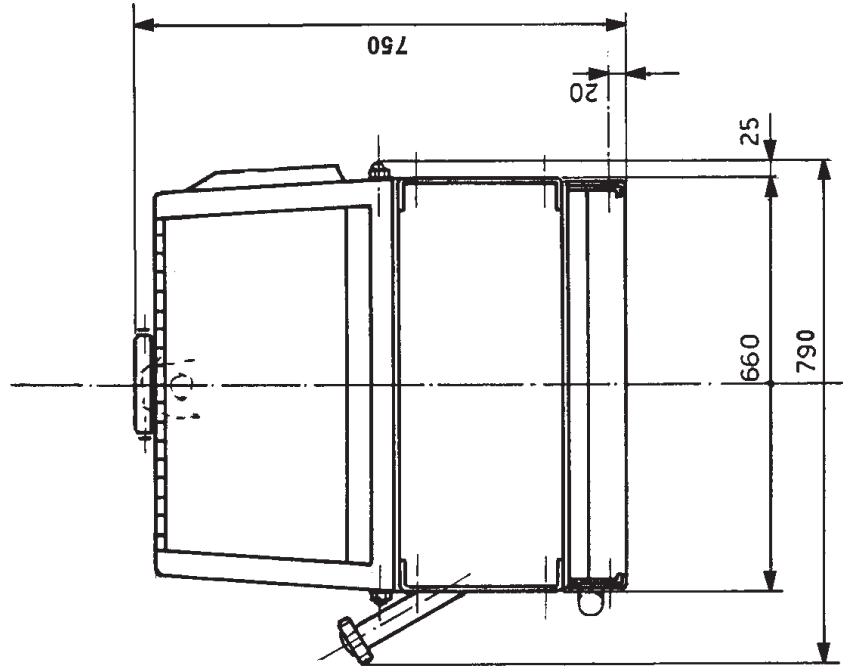
In case of necessity for first aid and fire prevention, see page M2.5.



**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.



The information here below are to be intended only as indicative since the above norm is much larger. For further details please see the specific norms and/or the manufacturers of the product to be used in the welding process.

#### RUTILE ELECTRODES: E 6013

Easily removable fluid slag, suitable for welding in all position. Rutile electrodes weld in d.c. with both polarities (electrode holder at + or -) and in a.c.. Suitable for soft steels R-38/45 kg/mm<sup>2</sup>. Also for soft steels of lower quality.

#### BASIC ELECTRODES: E 7015

Basic electrodes weld only in d.c. with inverse polarity (+ on the electrode holder) ; there are also types for a.c. Suitable for impure carbon steels. Weld in all position.

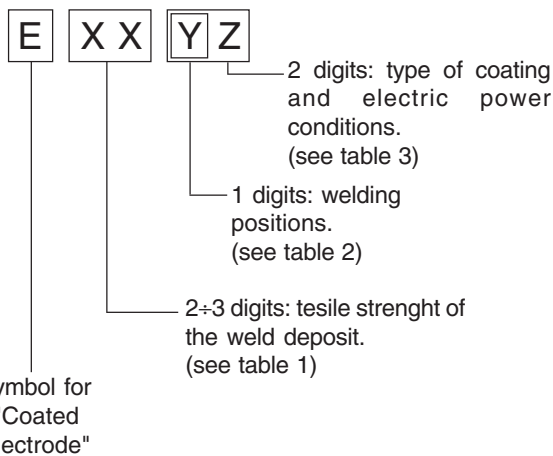
#### HIGH YIELD BASIC ELECTRODES: E 7018

The iron contained in the coating increases the quality of metal added. Good mechanical properties. Weld in all position. Electrode holder at + (inverse polarity). Weld deposit of nice aspect, also vertical. Workable; high yield. Suitable for steels with high contents of sulphur (impurities).

#### CELLULOSIC ELECTRODES: E 6010

Cellulosic electrodes weld only in d.c. with polarity + electrode holder - ground clamp. Special for steels run on pipes with R max 55 kg/mm<sup>2</sup>. Weld in all position. volatile slag.

## ELECTRODES IDENTIFICATION ACCORDING TO A.W.S. STANDARDS



Number	Strength	
	K.s.l.	Kg/mm <sup>2</sup>
60	60.000	42
70	70.000	49
80	80.000	56
90	90.000	63
100	100.000	70
110	110.000	77
120	120.000	84

Table 1

1	for all positions
2	for plane and vertical
3	for plane position only

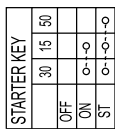
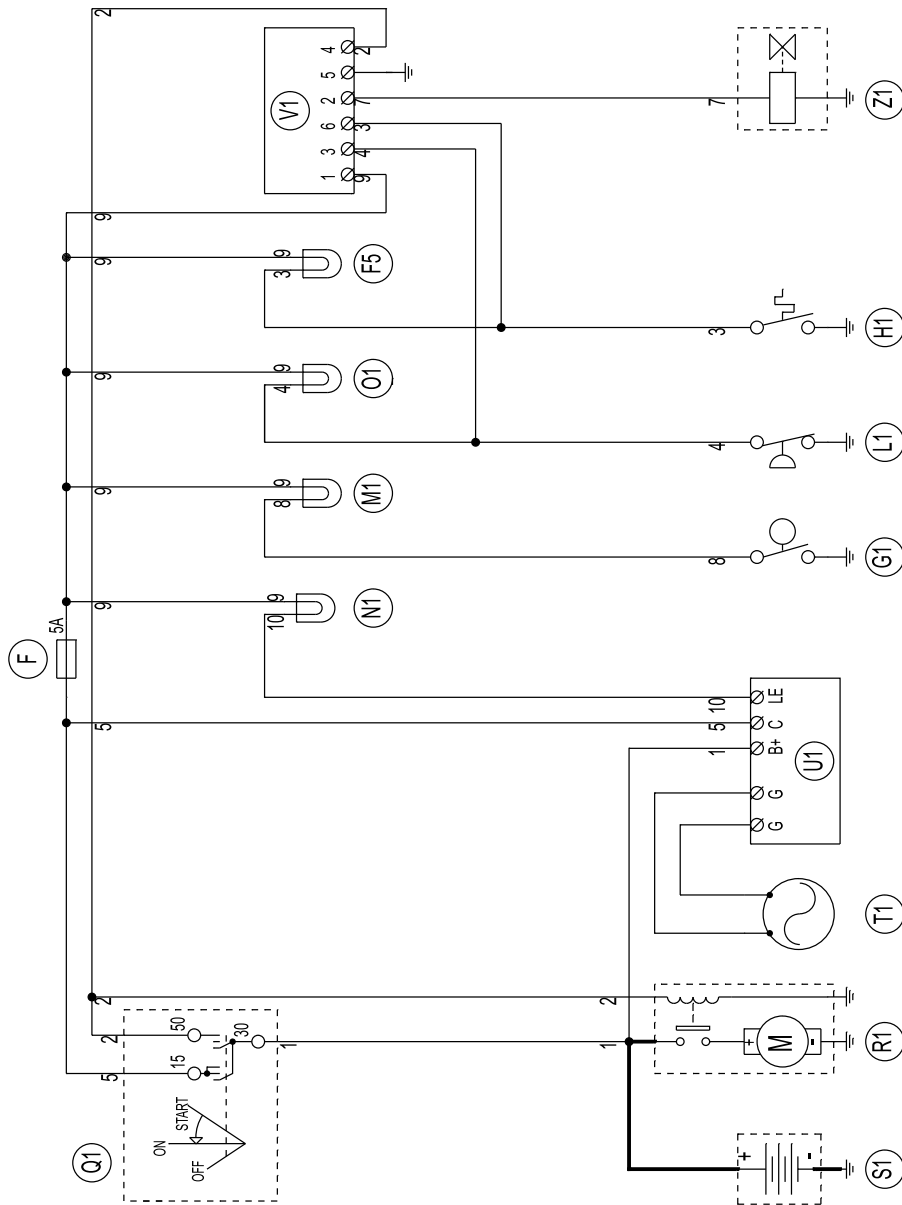
Table 2

N°	Descrizione
10	Cellulose electrodes for d.c.
11	Cellulose electrodes for a.c.
12	Rutile electrode for d.c.
13	Rutile electrode for a.c.
14	High yield rutile electrodes
15	Basic electrodes for d.c.
16	Basic electrodes for a.c.
18	High yield basic electrodes for d.c. (inverse polarity)
20	Acid electrodes for flat or front position welding for d.c. (- pole) and for a.c.
24	High yield rutile electrodes for flat or front plane position welding for d.c. and a.c.
27	High yield acid electrodes for flat or front plane position welding for d.c. (- pole) and a.c..
28	High yield basic electrodes for flat or front plane position welding for d.c. (inverse polarity)
30	Extra high yield acid electrodes, extra high penetration if required, for flat position welding only for d.c. (- pole) and a.c.

Table 3

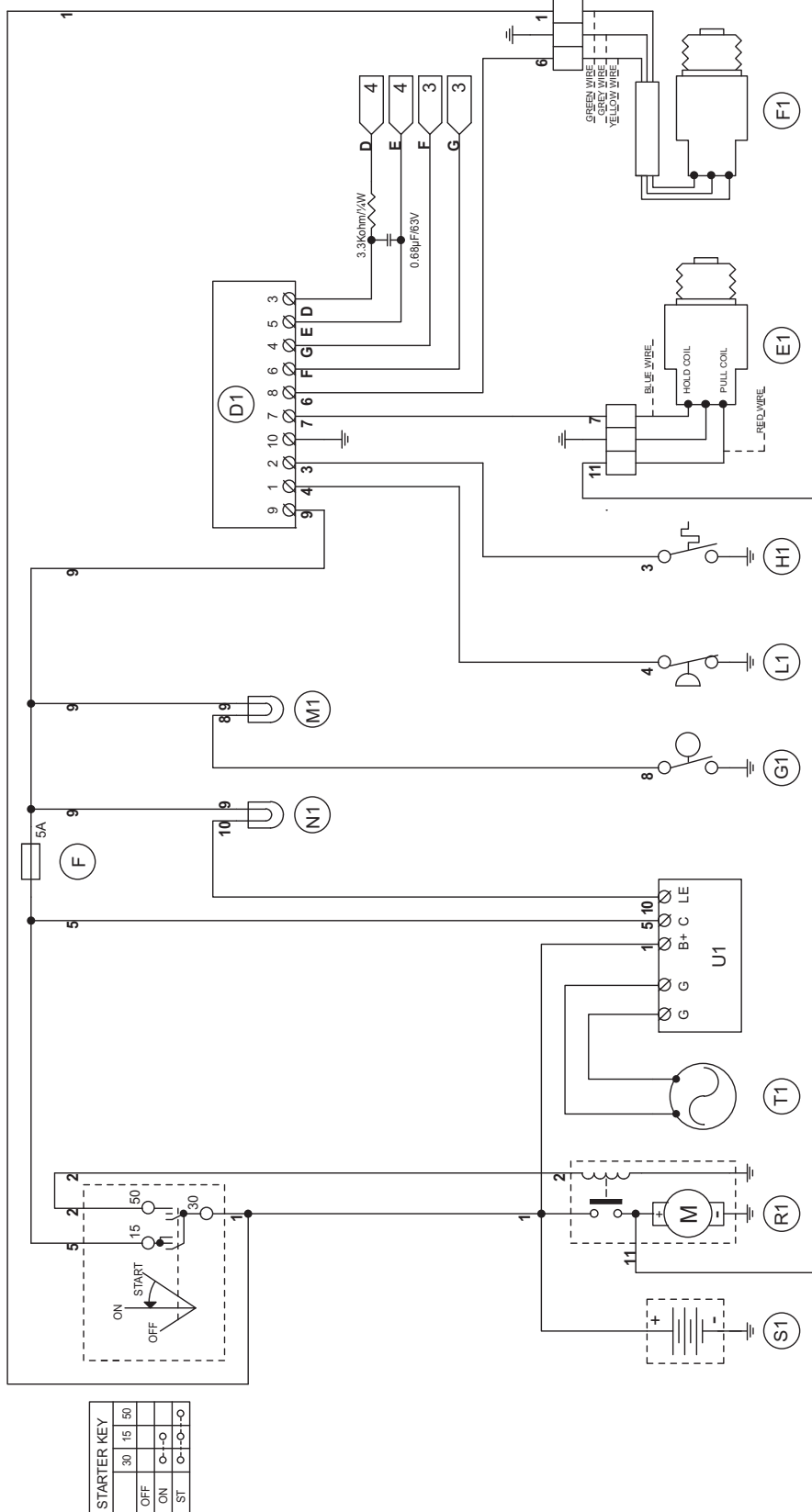


A	: Alternator	A3	: Insulation monitoring	A6	: Commutator/switch
B	: Wire connection unit	B3	: E.A.S. connector	B6	: Key switch, on/off
C	: Capacitor	C3	: E.A.S. PCB	C6	: QEA control unit
D	: G.F.I.	D3	: Booster socket	D6	: Connector, PAC
E	: Welding PCB transformer	E3	: Open circuit voltage switch	E6	: 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 transformer	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	:



Esp. Exp.		Modifica Modification		Dis. Desi.		Appr. Appr.	
MOSA		Engine Ruggerini RD 180/210 (EV)		20529.prg		2 3	
20090-CUSAGO (MI)-ITALY <a href="http://www.mosa.it">http://www.mosa.it</a>		Machine: GE 10000 SC		Project: 21982.S.010		Approvato:	
		Designator: Leporace N.		Date: 09.05.2000		Dis. n.º: 21982.S.010	
		Designer: Leporace N.				Approvato:	

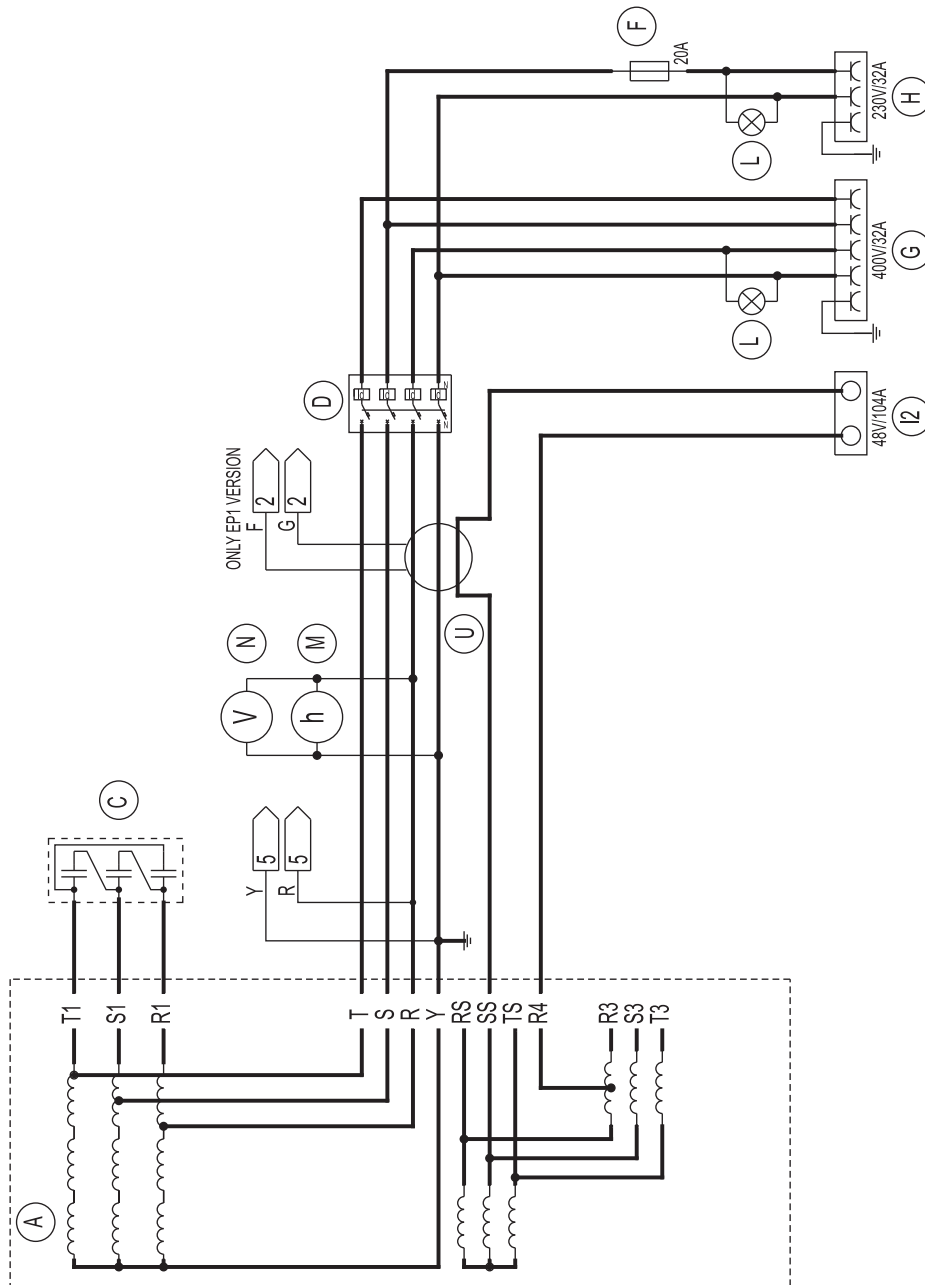
La MOSA si riserva a termini di legge la proprietà del presente disegno con divieto di riprodurlo o comunicarlo a terzi senza sua autorizzazione



STARTER KEY	
30	50
OFF	ON
ON	OFF
ST	ON

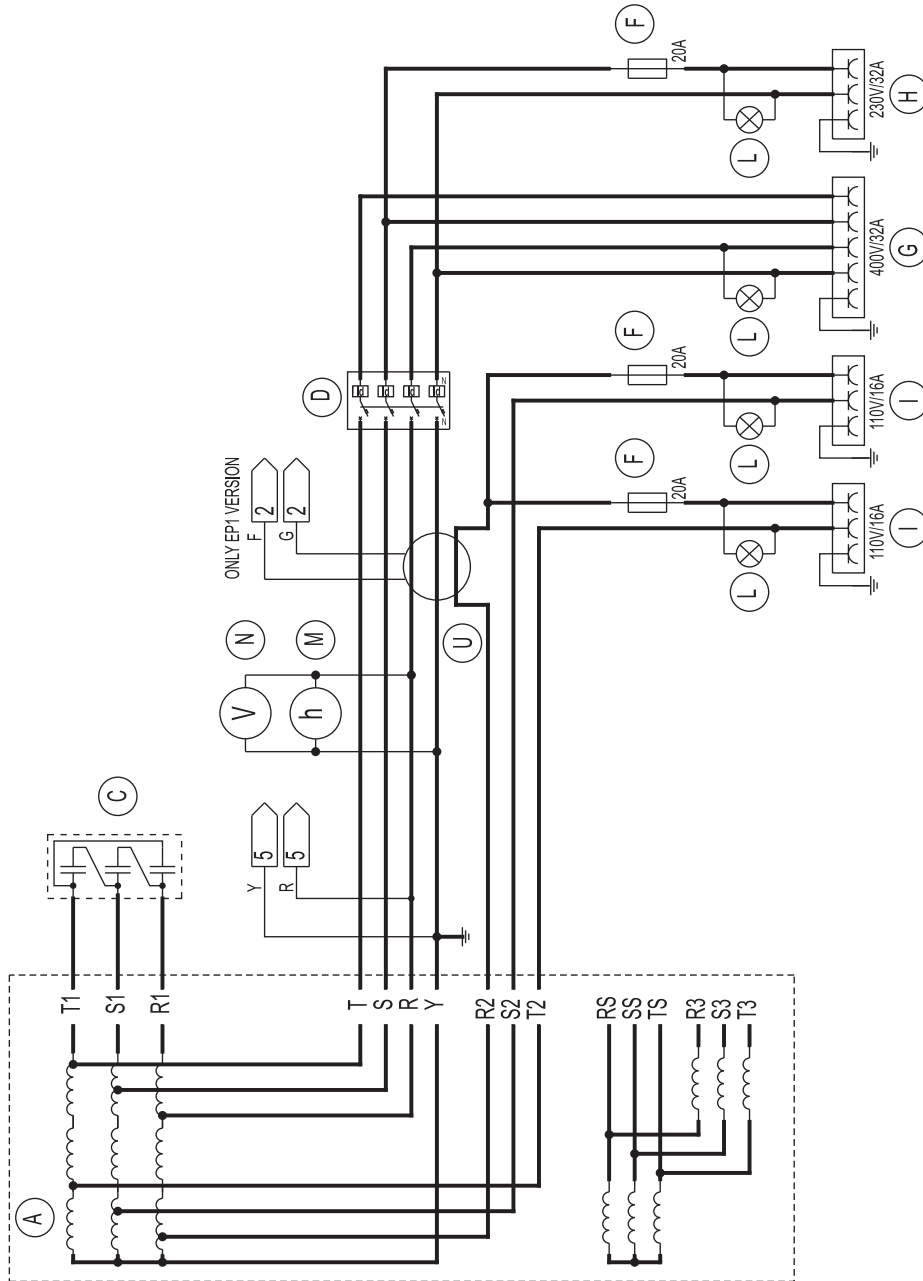
C	Sostituto elettromagnete stop con modello senza elettronica (E1).	15.02.2008	N.L.
B	Sostituiti elettromagneti con modello OEI (E1) (F1).	25.07.2007	N.L.
A	Aggiunto filtro RC sui morsetti 3 e 5 dell'EP1.	17.05.2007	N.L.
Rep. Exp.	Modifica	Date	Dis. Detti.
Da Pag. Denominazione: Engine Ruggerini RD 210 (EP1) From Page Denomination:		Progetto: 21986.prg	Pag. n° di n°
Alla Pag. Macchina: Leporace N. 21986.S.010-C To Page Machine: TS 300 SC <a href="http://www.mosa.it">http://www.mosa.it</a>		Date: 12.05.2000	Page n° of n°
Disegnatore: Leporace N. 21986.S.010-C Designer:		Dis. n°: 21986.prg	Dis. n°: 21986.prg
Approvato: <i>[Signature]</i> Approved:		Date: 12.05.2000	Date: 12.05.2000

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



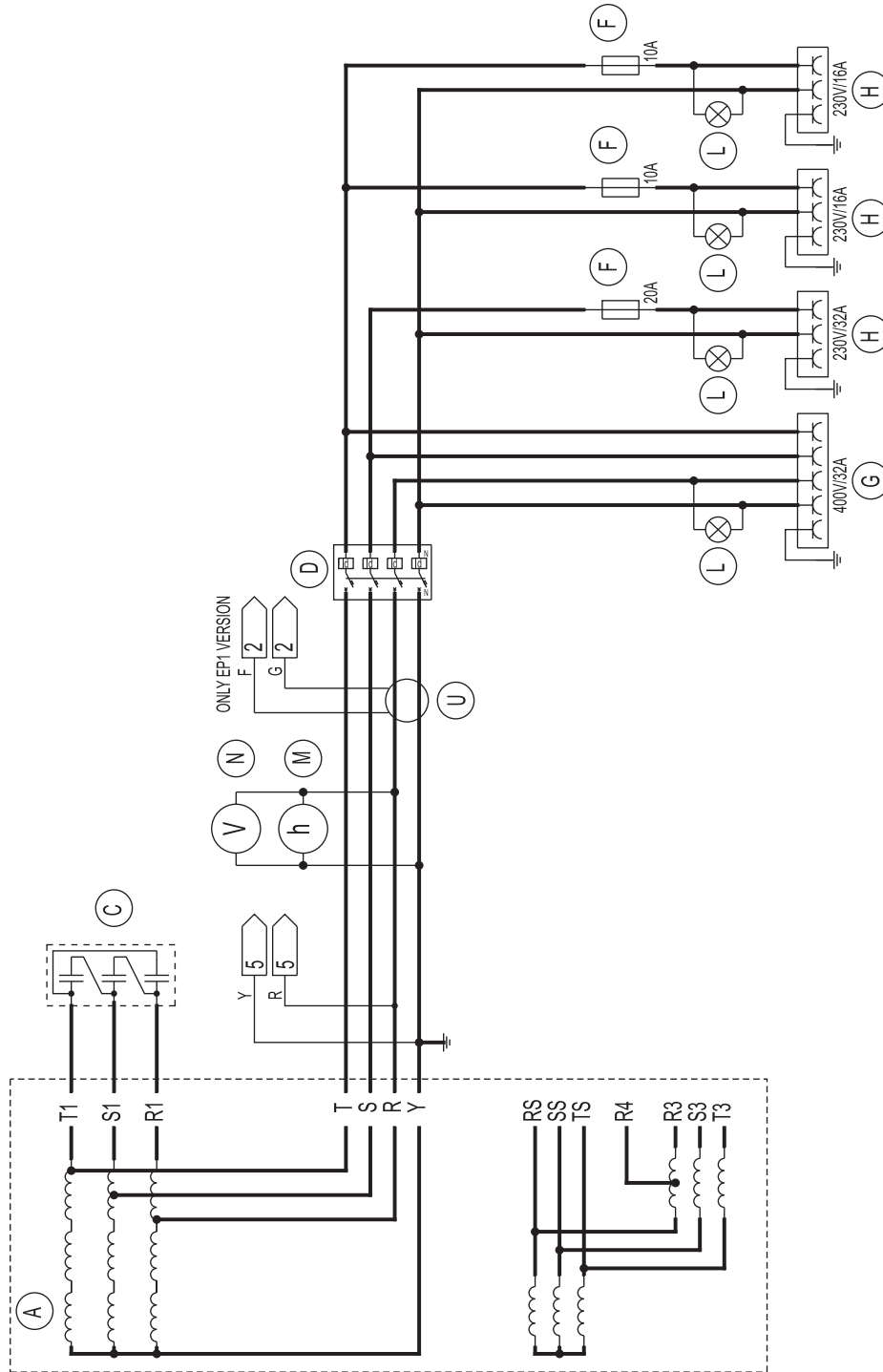
Esp. Exp.	Modifica Modification	Data Date	Appr. Appr.
	Denominazione: Denomination:	Progetto: Project:	Dis. Dess.
	Aux. (400T/230M/48M) D	21982.prg	di n° of n°
	Machine: TS 300 SC		Page n° of n°
	Dis. n°: 21982.S.020		3
	Machine: TS 300 SC		5
	Designator: Designer: Leporace N.	Date: 09/05/2000	Approvato: Approved:
	Machine: TS 300 SC		

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



Esp. Exp.	Modifica	Data	Dis. Dess.	Appr. Appr.
	Modification	Date	Project: Project	Page n° of n°
	Denominazione: Denominazione:	21986.prg	3	5
	Aux. (400T/230M/110CTEX2) D			
	Machine: Machine:	Dis. n°: Dis. n°:	Approvato: Approvato:	
	TS 300 SC	21986.S.020	12/05/2000	
		Designator: Designator:		
		Leporace N.		

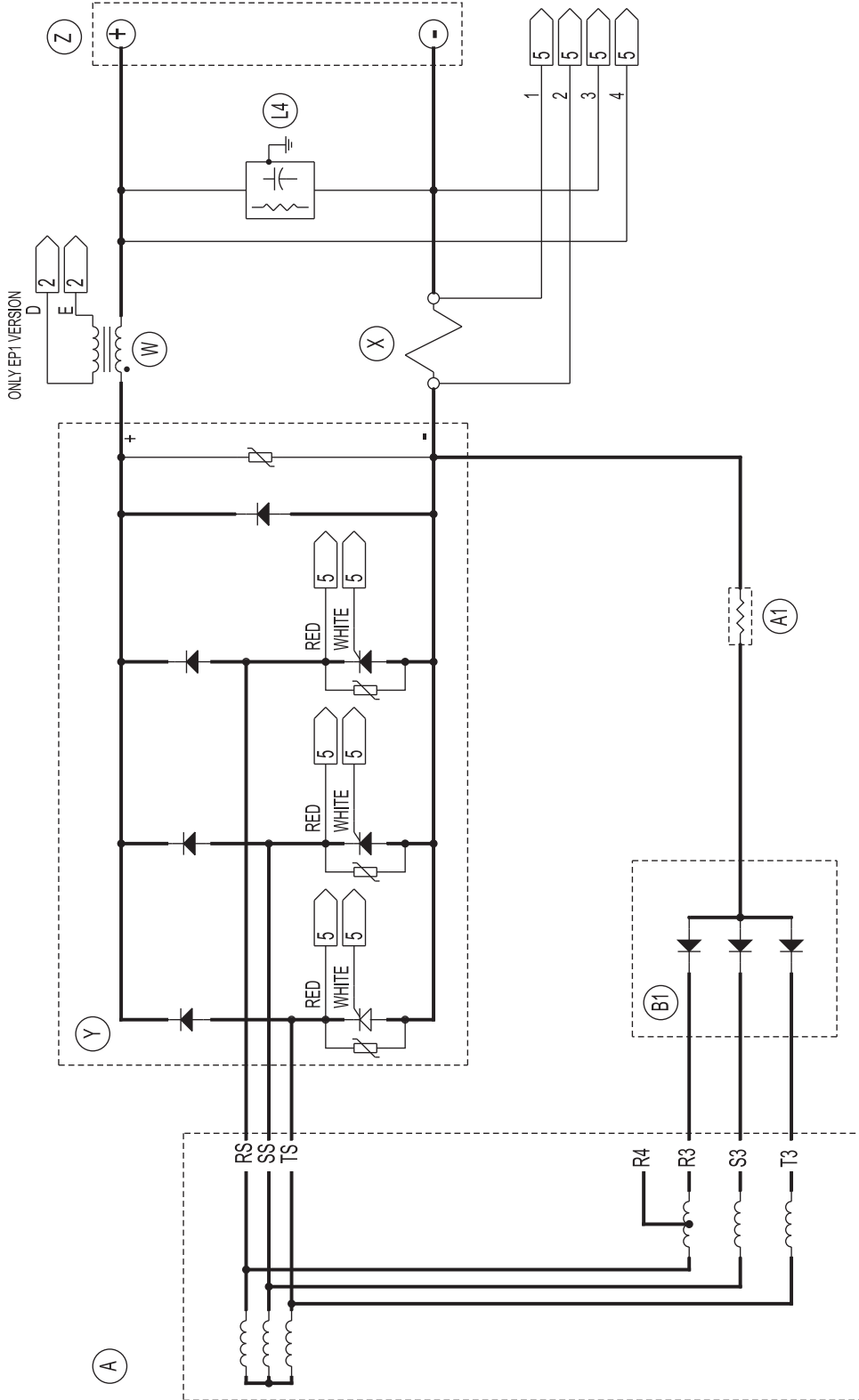
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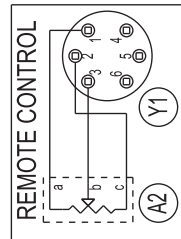
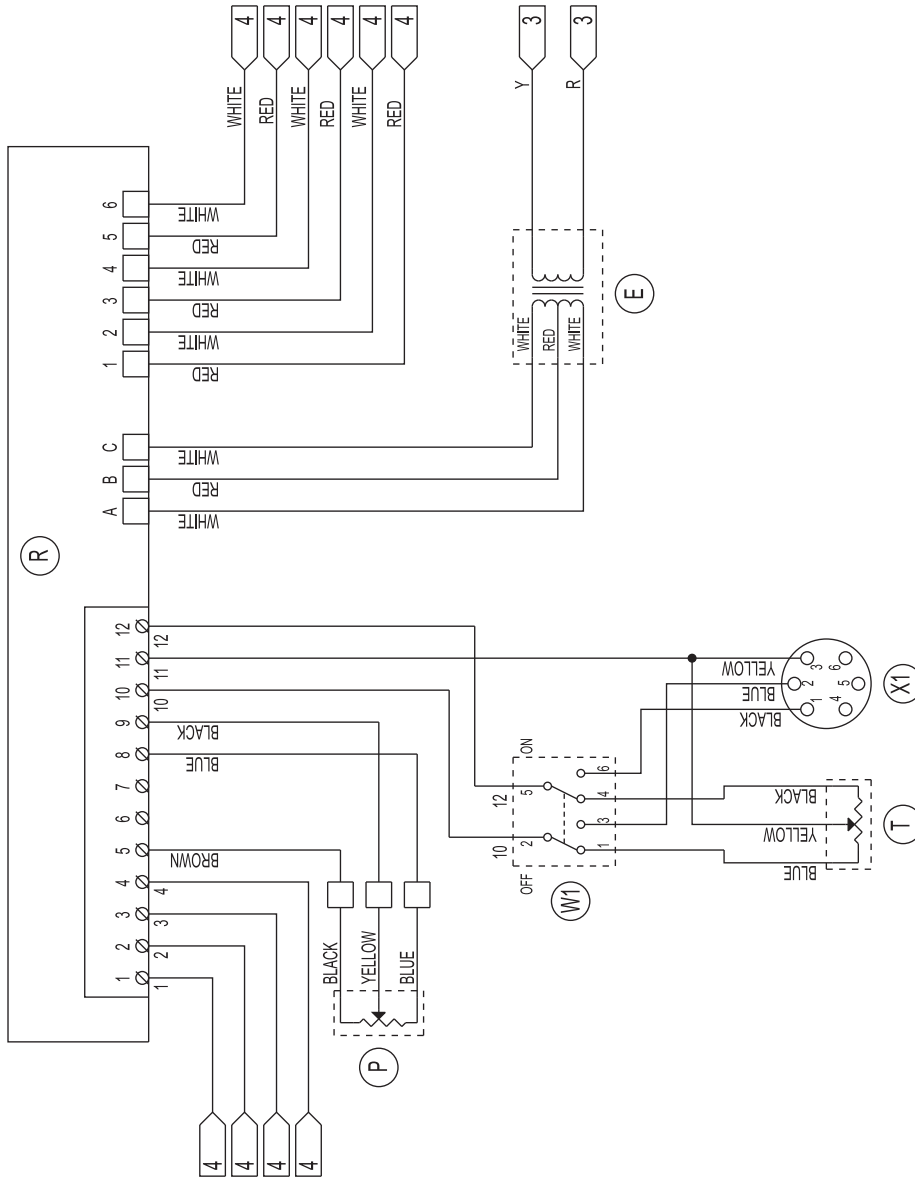
Exp. Exp.	Modifica Modification	Date Date	Appr. Appr.
Da Pagina From Page	Denominazione Denomination	Dis. n.° Project	di n.° of n.°
5	AUX. (400T/230Mx3) D	21998.prg	3
5			5
Alia Pag. To Page	Disegnato: Designer	Dis. n.° Draw. n.°	Approvato: Approved
5	Leporace N.	21998.S.020	
Alia Pag. To Page	Macchina: Machine		
5	TS 300 SC		

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Esp. Exp.	Modifica	Date	Dis. Des.	Appr. Appr.
	Denominazione:	Projecto:	Projecto:	Projecto:
	From Page	21982.prg	21982.prg	21982.prg
	Ala Pag.	Dis. n.°	Dis. n.°	Dis. n.°
	To Page	21982.S.030	21982.S.030	21982.S.030
	Machine:	Disegnato:	Disegnato:	Disegnato:
	TS 300 SC	Leporace N.	Leporace N.	Leporace N.
		Date:	Date:	Date:
		09/05/2000	09/05/2000	09/05/2000
		http://www.mosa.it	http://www.mosa.it	http://www.mosa.it
		La MOSA si riserva a termini di legge la proprietà del presente disegno con divieto di riprodurlo o comunicarlo a terzi senza sua autorizzazione		



Esp. Exp.	Modifica Modification	Data Date	Dis. Dess.	Appr. Appr.
	Denominazione: Denomination: Welding Control	Projecto: Project: 21982.prg	Page n° Page n° 5	di n° of n° 5
	Dis. n° Drive n° 21982.S.040	Data: Date: 09/05/2000	Disegnatore: Designer: Leppace N.	Approvato: Approved:
	Machine: TS 300 SC			

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



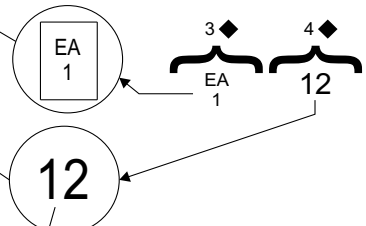
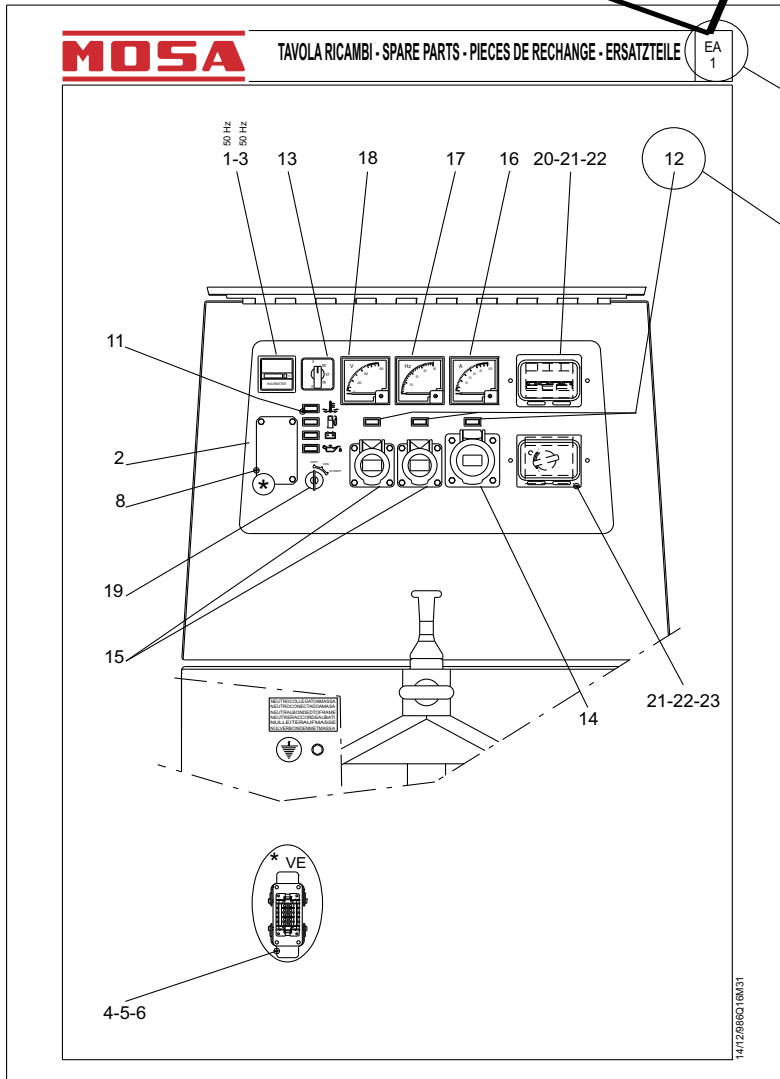
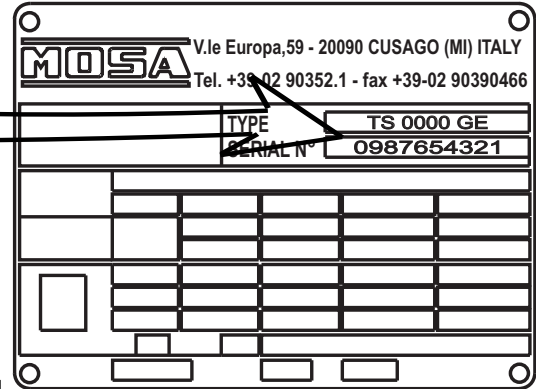
## MOSA guarantees that any request for spare parts will be satisfied.

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. \*

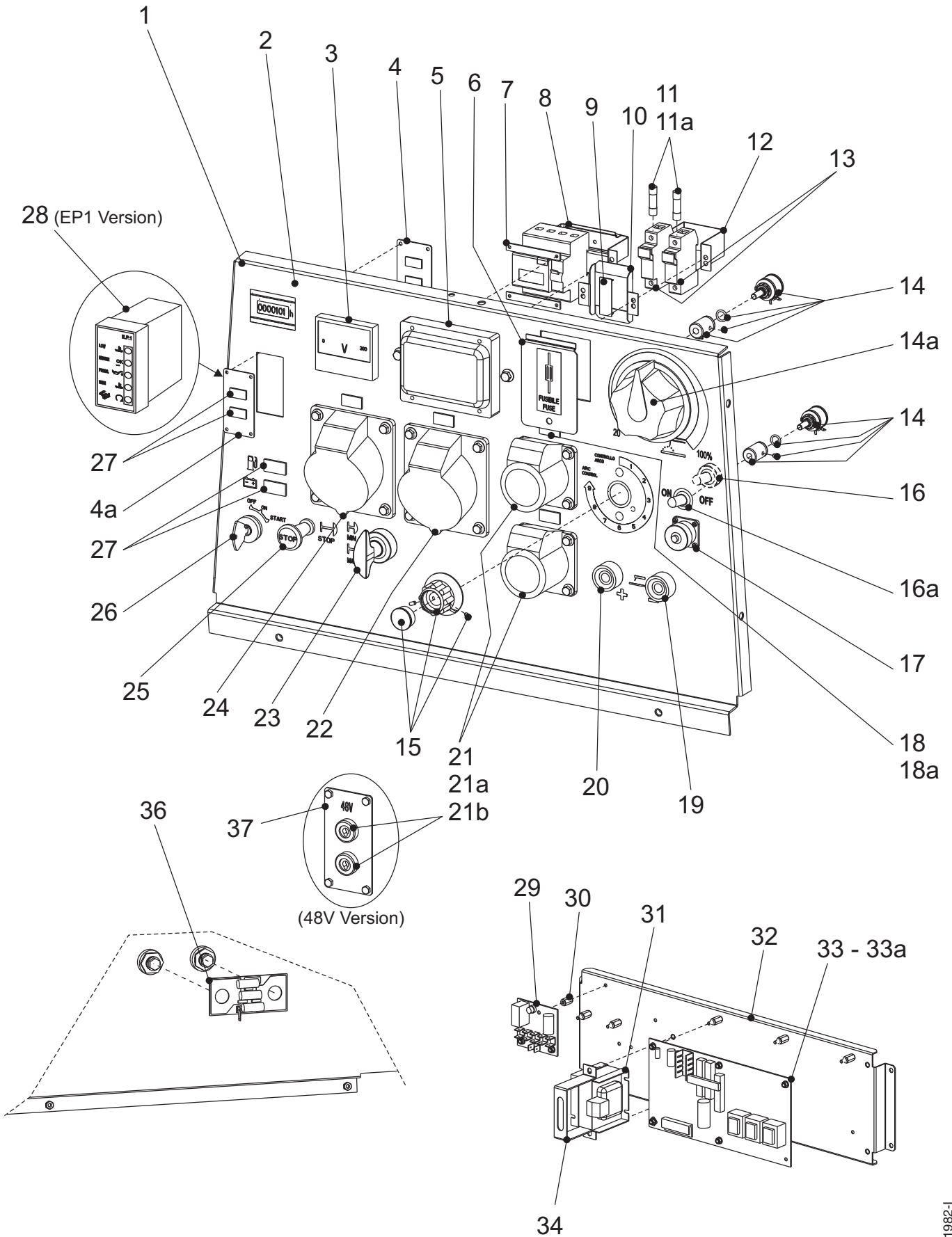
When ordering the spare parts, it is recommended to indicate:

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



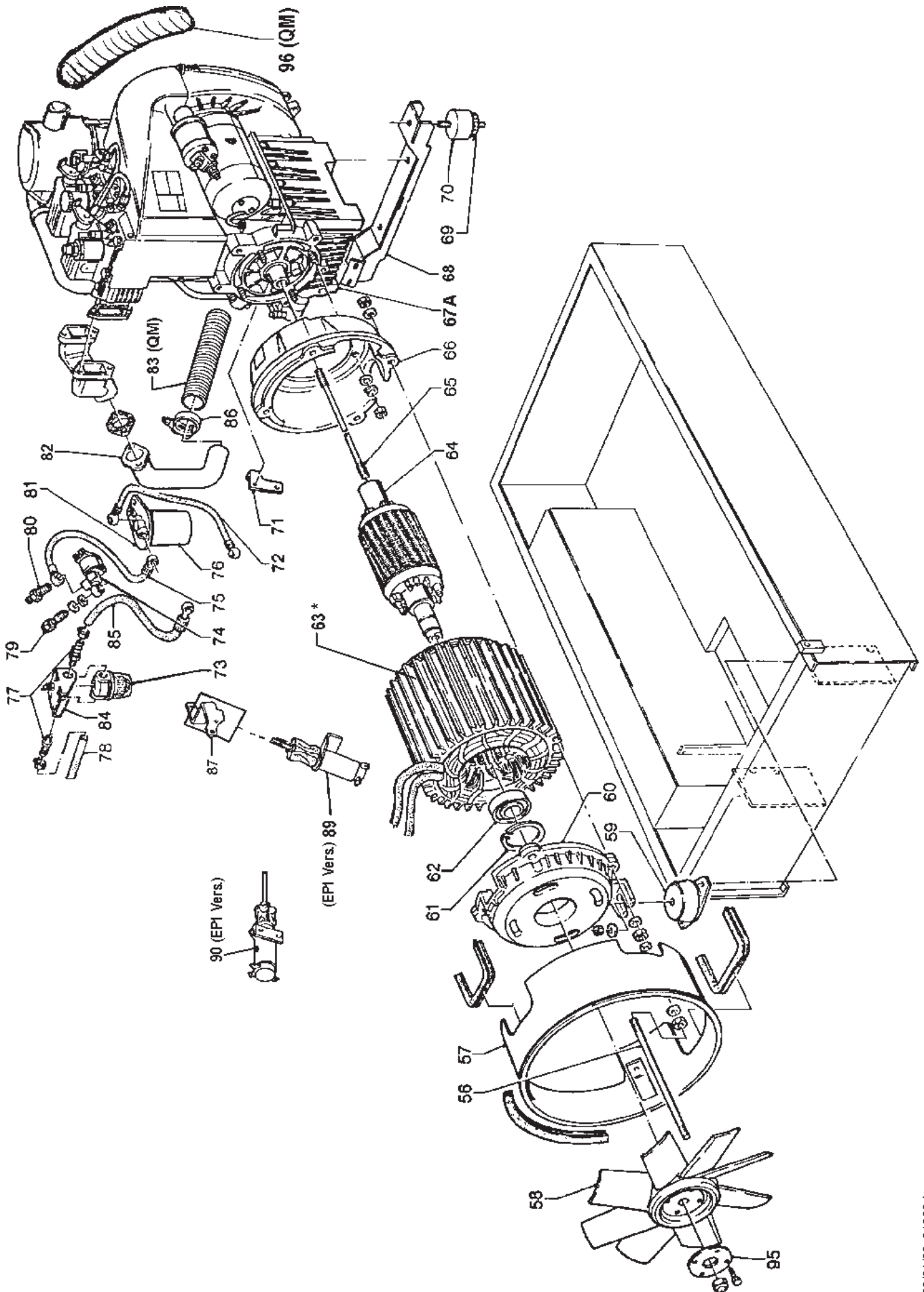
### ABBREVIATIONS AND SYMBOLS:

- (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

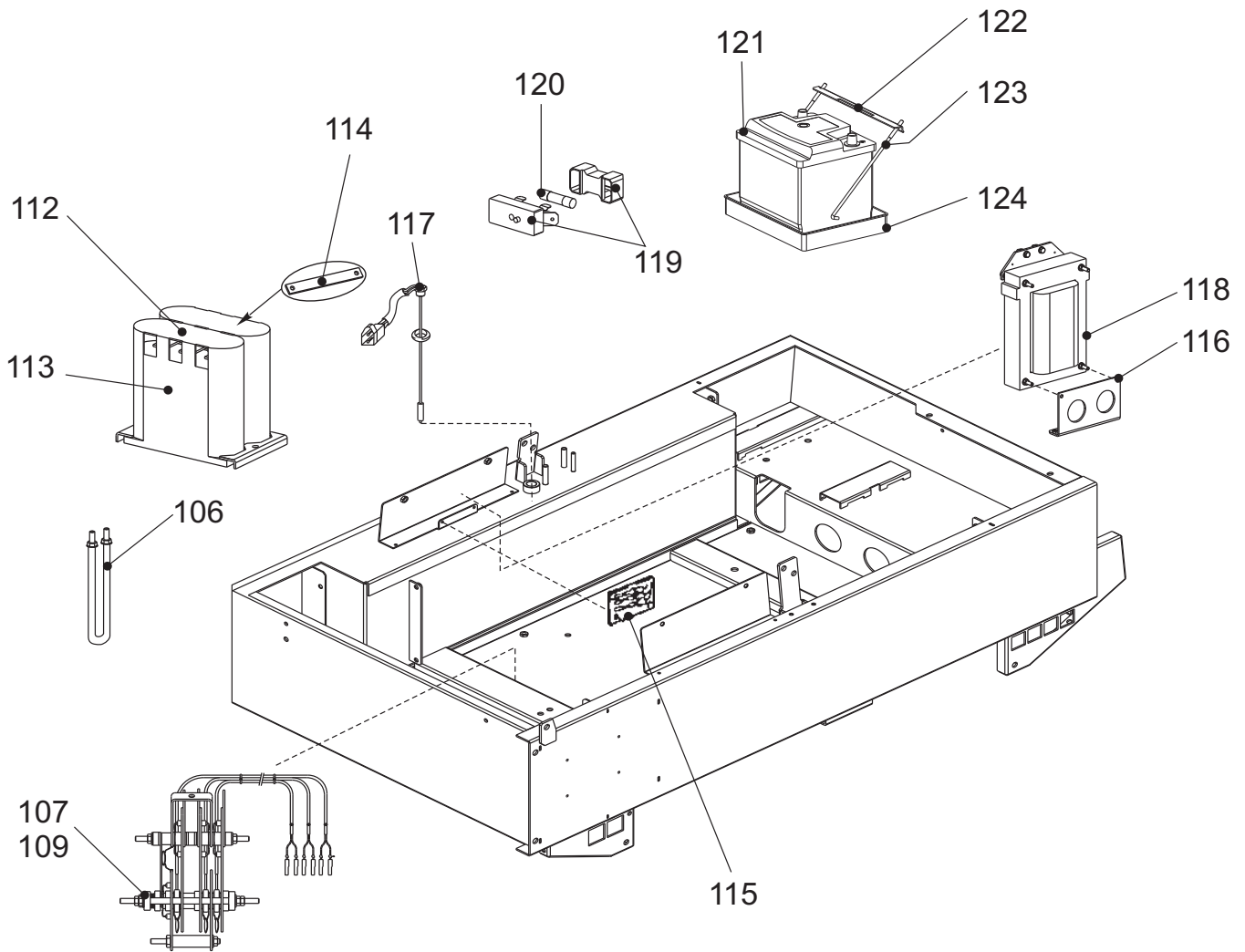


<i>Pos. Rev.</i>	<i>Cod.</i>	<i>Descr.</i>	<i>Note</i>
1	219937020	PANNELLO FRONTALE / FRONT PANEL	
2	105511810	CONTAORE 230V 50Hz IP65 / HOURMETER 230V 50Hz IP65	
3	103011310	VOLTMETRO FONDO SCALA 300V / VOLTMETER 300V	
4	A 773317034	PIASTRINA FISS.COPERCH.SPIE / FIXING PLATE WARNING LAMP COVER	Era 209717027
4a	773317032	COPERCHIETTO PORTA SPIE / WARNING LIGHT HOLDER	
5	219937130	COPERCHIO INTERRUT.DIFFERENZ. / COVER GFI	
6	219937235	COPERCHIO / COVER	
7	219937105	INTERRUTTORE DIFFERENZIALE / GROUNDFAULT INTERRUPTOR (GFI)	
8	219937036	STAFFA / BRACKET	
9	107519046	COPERCHIO PER PORTAFUSIBILE / BLIND PLATE, FUSE HOLDER	
10	219937234	STAFFA / BRACKET	
11	1291260	FUSIBILE / FUSE	
11a	1291230	FUSIBILE / FUSE	
12	219937228	STAFFA / BRACKET	
13	107509045	PORTAFUSIBILE / HOLDER, FUSE	
14	0000107509715	GRUPPO POTENZIOMETRO / POTENTIOMETER	Fino a/Up to REV.1-01/06 Del.134-15/09/06
14	836709715	POTENZIONETRO / POTENTIOMETER	Da/From to REV.2-02/08 Del.134-15/09/06
14a	107509702	MANOPOLA / KNOB, WELDING CURRENT REG.	Da/From to REV.2-02/08 Del.134-15/09/06
15	0000207409750	GR.REGOLATORE ARCO SALDATURA / ARC FORCE REGULATOR	Fino a/Up to REV.1-01/06 Del.134-15/09/06
15	308300543	MANOPOLA REGOL.COMPL. / KNOB, REGULATOR COMPL.	Da/From to REV.2-02/08 Del.134-15/09/06
16	102042740	CAPPUCCIO / CAP	
16a	102013290	COMMUTATORE / COMMUTATOR	Era 107509060
17	21970C051	GR.CAVI X COM.A DIST.TC2/TC3 / CABLES FOR REMOTE CONTROL	Era 209509910
17	21982C042	GR.CAVI SEGN.COMANDI (SALD) / SIGNALS AND CONTROLS CABLES GR.	Fino a/Up to REV.1-01/06 Del.134-15/09/06
18	1302220	SPIA 230V / WARNING LIGHT 230V	Da/From to REV.2-02/08 Del.134-15/09/06
18	1302530	SPIA 230V / WARNING LIGHT 230V	Fino a/Up to REV. 2-02/08 Del.63/08-17/3/08
18a	1302160	SPIA 110V / WARNING LIGHT 110V	Da/From to REV.3-05/09 Del.63/08-17/3/08
18a	1302520	SPIA 110V / WARNING LIGHT 110V	Fino a/Up to REV.2-02/08 Del.63/08 17/3/08
19	102044400	PRESA DI SALDATURA (-) / WELDING SOCKET (-)	Da/From REV.3-05/09 Del.63/08-17/3/08
20	102301310	PRESA DI SALDATURA (+) / WELDING SOCKET (-)	
21	307047250	PRESA CEE 110V 16A 2 P+T / EEC SOCKET 110V 16A 2 P+N	
21a	307017240	PRESA 220V 16A / EEC SOCKET 16A, 220V 2P+T	
21b	101131220	PRESA DINSE / SOCKET	
22	105111510	PRESA CEE 380V TRIFASE / EEC SOCKET THREE-PHASE 380V	
23	209719105	COMANDO ACCELERATORE / ACCELERATOR LEVER	
24	105111520	PRESA CEE 220V MONOF. 2P+T / EEC SOCKET SINGLE-PH.220V 2P+N	
25	209719110	COMANDO ARRESTO MOTORE / ENGINE STOP	EV Version
26	107302460	STARTER A CHIAVE / STARTER KEY	
27	1302040	SPIA ROSSA 12V / RED WARNING LIGHT 12V	Fino a/Up to REV.2-02/08 Del.63/08-17/3/08
27	1302500	SPIA ROSSA 12V / RED WARNING LIGHT 12V	Da/From to REV.3-05/09 Del.63/08-17/3/08
28	209500015	UNITA' CONTROLLO MOTORE EP1 / PCB, ENGINE CONTROL EP1	
29	209719850	SCHEDA EV/ES / PCB EV/ES	
30	282009807	DISTANZ. ISOLANTE PER SCHEDE / SPACER	
31	107509870	TRASFORMATORE / AUXILIARY TRANSFORMER	
32	219939801	PIASTRA / PLATE	
33	217609654	SCATOLA PROT.SCHEDA SALD. / BOX PROTECTION PCB WELDER	
33a	208019800	SCHEDA CONTROLLO SALDATURA / PCB, CONTROL WELDING	
34	218019874	STAFFA BLOCC.TRASFORM.AUSIL. / BRACKET	
36	700409860	UNITA' FILTRO ANTIDISTURBI / ANTIJAMMING FILTER	
37	219937032	COPERCHIO PRESE 48V / COVER SOCKETS 48V	



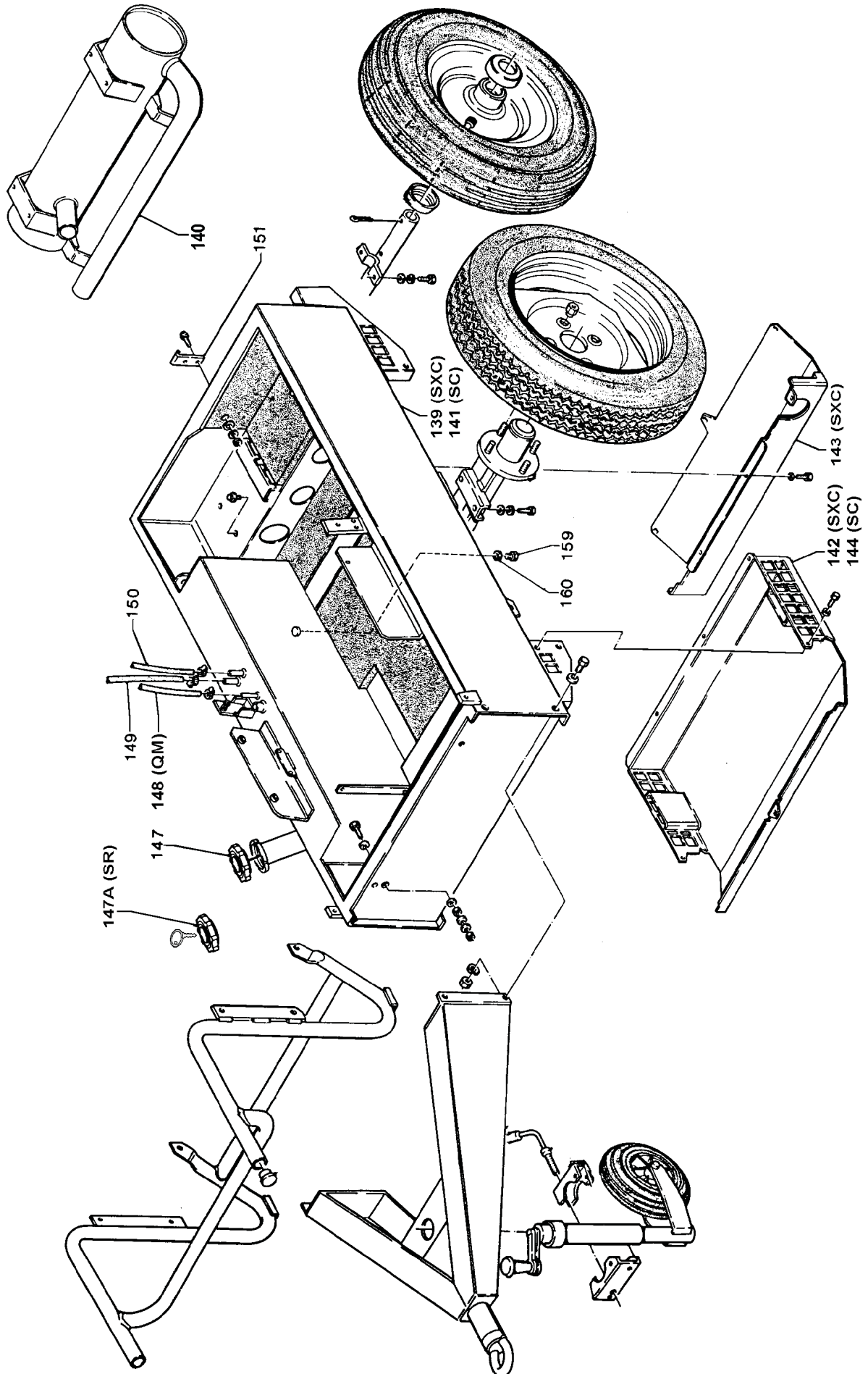


<i>Pos.</i>	<i>Rev. Cod.</i>	<i>Descr.</i>	<i>Note</i>
57	209716010	CONVOGLIATORE / FAN COVER	
58	107301420	VENTOLA / FAN	
59	309501035	SUPPORTO ELASTICO / SUPPORT, FLEXIBLE	
60	309503045	FLANGIA PORTA ALTERNATORE / ALTERNATOR FLANGE	
61	6050050	ANELLO SEEGER / RING, SEEGER	
62	1001060	CUSCINETTO / BEARING	
63	209703020	STATORE / STATOR	TS 250 400/230/48
63b	219823025	STATORE / STATOR	TS 300 400/230/48
63e	219863025	STATORE / STATOR	TS 300 400/230/110
64	309503030	ALBERO CON ROTORE / SHAFT WITH ROTOR	
65	309503036	TIRANTE / TIE-ROD	
66	309503040	FLANGIA / FLANGE	
67a	209502200	MOTORE LOMBARDINI 12LD 477/2 / LOMBARDINI ENGINE 12LD 477/2	
68	209812035	TRAVERSA SUPPORTO MOTORE / ENGINE SUPPORT CROSSBAR	
69	105112020	ANTIVIBRANTE / VIBRATION DAMPER	
70	307012037	PROTEZIONE ANTIVIBRANTE / PROTECTION, VIBRATION-DAMPER	
71	209712232	SQUADRETTA / BRACKET	no EP1 version
72	209712206	TUBO COMBUSTIBILE / PIPE, FUEL	
73	209702228	PREFILTRO GASOLIO / PRE-FILTER DIESEL	
74	309409060	ELETTROVALVOLA / SOLENOID VALVE	no EP1 version
75	209712205	TUBO COMBUSTIBILE / PIPE, FUEL	
76	102011190	FILTRO NAFTA / FILTER, FUEL	
77	209702242	RACCORDO / PIPE FITTING FOR TANK	
78	209702207	TUBO COMBUSTIBILE / PIPE, FUEL	
79	309409061	VALVOLA NON RITORNO / NON RETURN VALVE	no EP1 version
80	309402225	VITE FORATA / SCREW, DRILLED	no EP1 version
81	102043150	SUPPORTO FILTRO / SUPPORT, FUEL FILTER	
82	219932070	TUBO DI SCARICO / EXHAUST PIPE	
83	309502077	TUBO FLESSIBILE FINITO / FLEXING PIPE	(QM) Era 209712077
84	209702241	SUPPORTO FILTRO / SUPPORT, FILTER	
85	209702203	TUBO COMBUSTIBILE / PIPE, FUEL	
86	A 6087740	FASCETTA STR.TUBO 38-50 ACC.ZN / CLAMP	era 6087720
87	209812230	LEVA / LEVER	(SR) EP1 version
89	A 0000219869050	SOLENOIDE ECONOMIZZATORE / SOLENOID ECON./ACCEL.	(EP1 Vers) Fino a/Up to Del.174- 25/07/07
89	264149050	ELETTROMAGNETE / SOLENOID	Fino a/Up to REV.1-01/06 Del.45- 25/02/08 Da/From REV.2-02/08 Del.45-25/02/08
90	A 0000219869055	SOLENOIDE ARRESTO MOTORE / SOLENOID, STOP	(EP1 Version) Fino a/Up to Del.174- 25/07/07
90	264149050	ELETTROMAGNETE / SOLENOID	Fino a/Up to REV.1-01/06 Del.45- 25/02/08
90	274009055	ELETTROMAGNETE / SOLENOID	Da/From REV.2-02/08 Del.45-25/02/08
95	209503038	ANELLO PER VENTOLA / RING FOR FAN	
96	1229810	TUBO FLESSIBILE (M.1) / FLEXIBLE PIPE (M.1)	(QM)



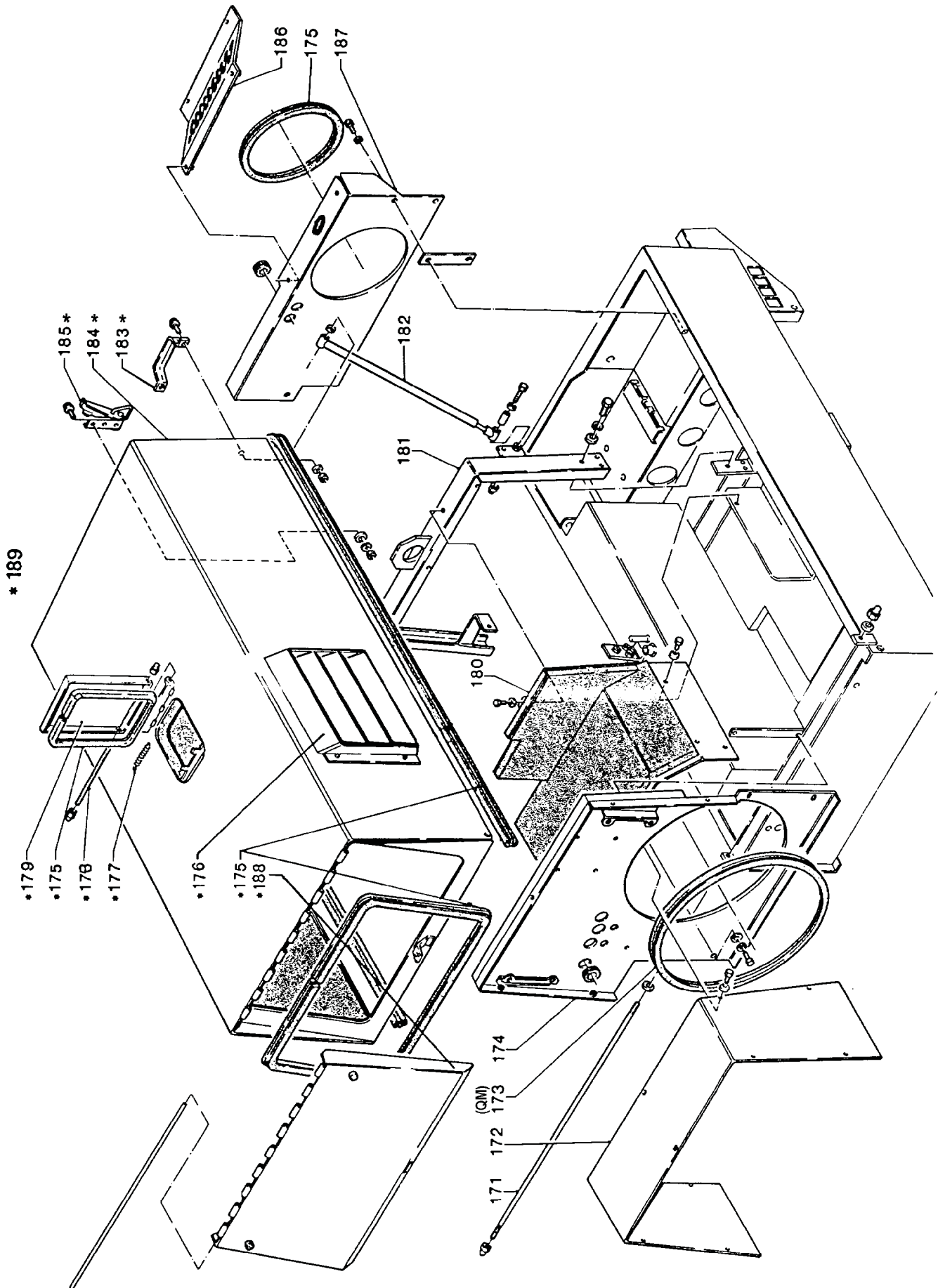
<i>Pos.</i>	<i>Rev. Cod.</i>	<i>Descr</i>	<i>Note</i>
106	309509065	RESISTENZA DI PRITT	TS 300 SC
107	a 219865100	PONTE DIODI	
109	217605091	STAFFA PONTE DIODI	
112	209719882	STAFFA BOX CONDENSATORI	
113	209719880	BOX CONDENSATORI 55MF	
114	107509041	SBARRETTA BOX CONDENSATORI	
115	309509035	UNITA' DIODI PRITT	TS 300 SC
116	209714110	SUPPORTO REATTANZA	
117	305719875	GALLEGGIANTE	
118	209504100	REATTANZA	
119	309859043	PORTAFUSIBILE	Era 309850525
120	1291120	FUSIBILE	
121	359259150	BATTERIA 45 Ah	Era 102041790
122	209509152	TRAVERSA FISSAGGIO BATTERIA	
123	105611270	TIRANTE PER BATTERIA	
124	102042380	VASCHETTA BATTERIA	

<i>Pos.</i>	<i>Rev. Cod.</i>	<i>Descr.</i>	<i>Note</i>
106	309509065	RESISTOR PRITT	TS 300 SC
107	a 219865100	DIODE BRIDGE	
109	217605091	DIODE BRIDGE BRACKET	
112	209719882	CAPACITOR BOX BRACKET	
113	209719880	CAPACITOR BOX 55MF	
114	107509041	CONNECTING PLATE-CAPACITOR BOX	
115	309509035	DIODES UNIT, PRITT	TS 300 SC
116	209714110	SUPPORT, REACTOR	
117	305719875	FLOAT	
118	209504100	REACTOR	
119	309859043	FUSEHOLDER	Was 309850525
120	1291120	FUSE	
121	359259150	BATTERY 45 Ah	Was 102041790
122	209509152	BRACKET, BATTERY FIXING	
123	105611270	TIE ROD, BATTERY	
124	102042380	HOLDER, BATTERY	



<i>Pos.</i>	<i>Rev. Cod.</i>	<i>Descr.</i>	<i>Note</i>
139	319930501	BASAMENTO (VERS.SX/C)	
140	309702050	SILENZIATORE DI SCARICO	
141	219931050	BASAMENTO (VERS.S/C)	
142	219930514	CASSONETTO ASPIRAZIONE	
143	319930515	CASSONETTO SCARICO	
144	309708200	CASSONETTO ASPIRAZ.ALTERNATORE	(SC)
147	342202026	TAPPO SERBATOIO	
147 A	317802026	TAPPO SERBATOIO CON CHIAVE	(SR)
148	107301890	TUBO SFIATO (L=MT.1)	
149	107502208	TUBETTO RITORNO GASOLIO	
150	209702203	TUBO COMBUSTIBILE	
151	107300180	CHIUSURA COMPL.A LEVA	
159	308101262	TAPPO SCARICO SERBATOIO	
160	308102023	GUARNIZIONE	

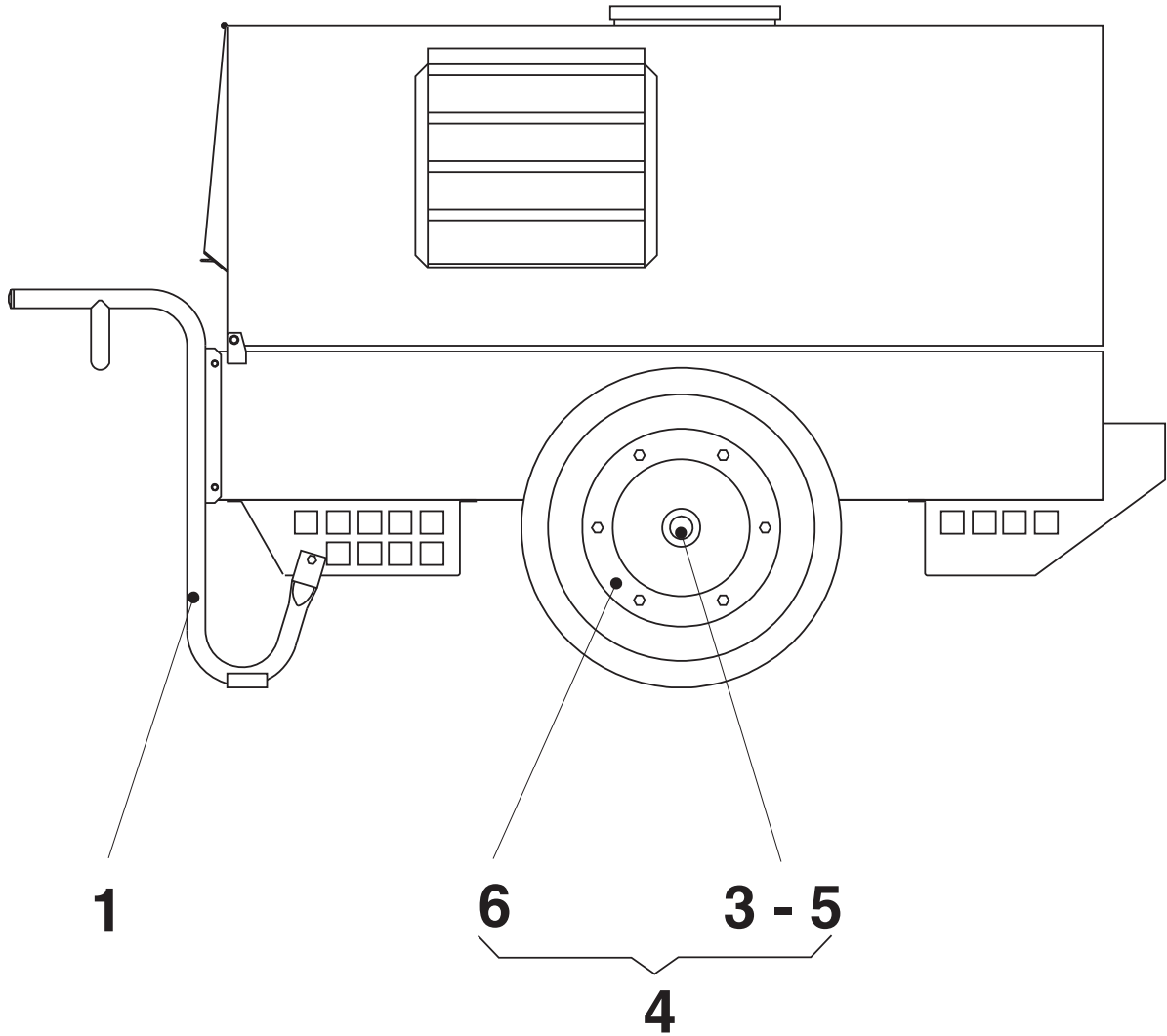
<i>Pos.</i>	<i>Rev. Cod.</i>	<i>Descr.</i>	<i>Note</i>
139	319930501	CRANKASE (VERS.SX/C)	
140	309702050	MUFFLER, EXHAUST	
141	219931050	CRANKCASE (VERS.S/C)	
142	219930514	INDUCTION CASE	
143	319930515	BOX, EXHAUST	
144	309708200	ALTERNATOR INTAKE BOX	(SC)
147	342202026	CAP, FUEL TANK	
147 A	317802026	CAP,TANK	(SR)
148	107301890	PIPE, BREATHER (L=MT.1)	
149	107502208	PIPE	
150	209702203	PIPE, FUEL	
151	107300180	LATCH	
159	308101262	FUEL TANK CAP	
160	308102023	GASKET	



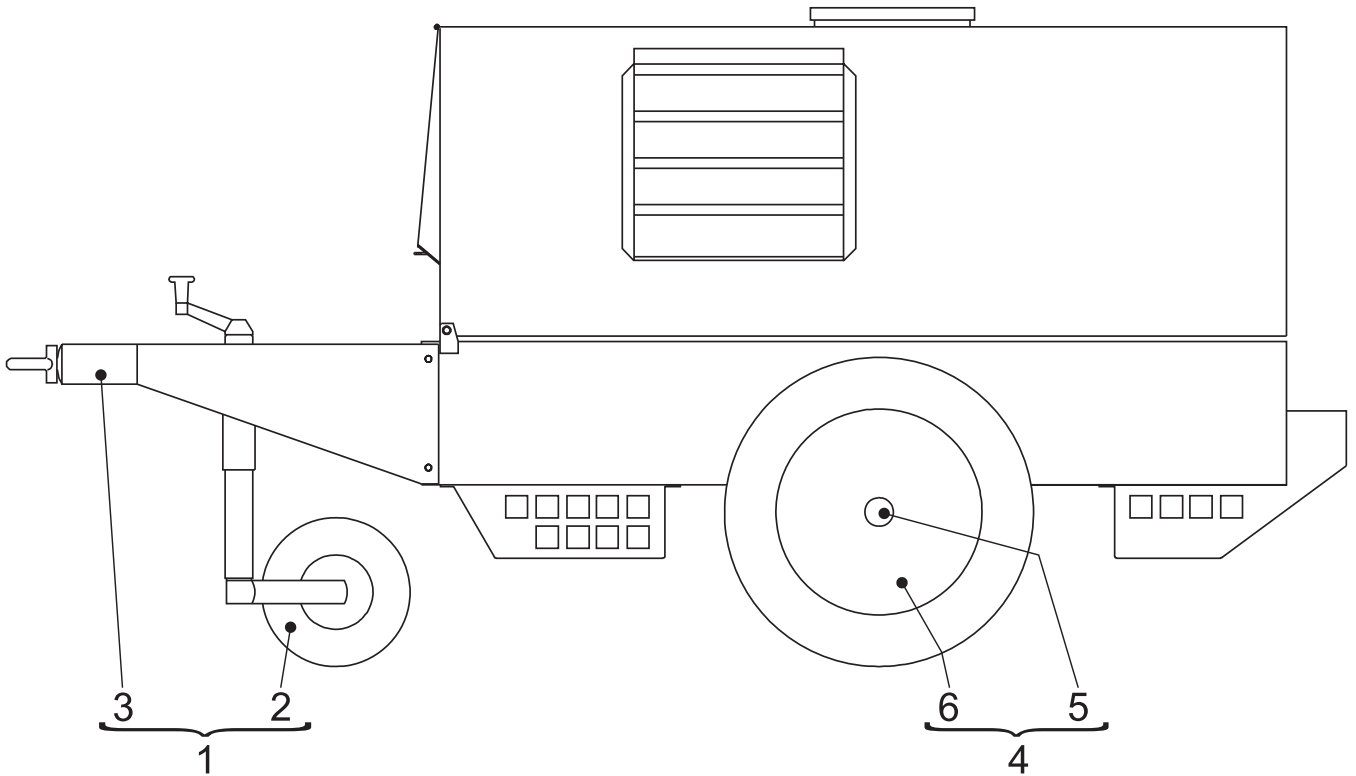


<i>Pos.</i>	<i>Rev. Cod.</i>	<i>Descr.</i>	<i>Note</i>
171	209718024	PERNO PER CERNIERA	
172	209718121	COPERTURA APPARECC. ELETTRICA	
173	102302280	GUARNIZIONE (L=MT.1)	
174	219930512	PARATIA ASPIRAZIONE	
175	105112270	GUARNIZIONE (L=MT.1)	
176	209808065	GRIGLIA USCITA ARIA	
177	102042870	MOLLA	
178	209718073	TIRANTE	
179	209718070	COPERCHIETTO	
180	219930513	COPERTURA ALTERNATORE	
181	209711100	ROLL BAR	
182	209508115	PISTONE SOSTEGNO	
183	A 343339601	MANIGLIA	Era 207509601
184	373008005	CARENATURA (COMPL.)	
185	107300180	CHIUSURA COMPL.A LEVA	
186	A 219828230	GRIGLIA ASPIRAZIONE ARIA	
187	A 219828200	PARATIA ASPIRAZ. MOTORE	
188	209748100	COPERCHIO FRONTALE	
189	219938280	GRUPPO CARENATURA	(EV)

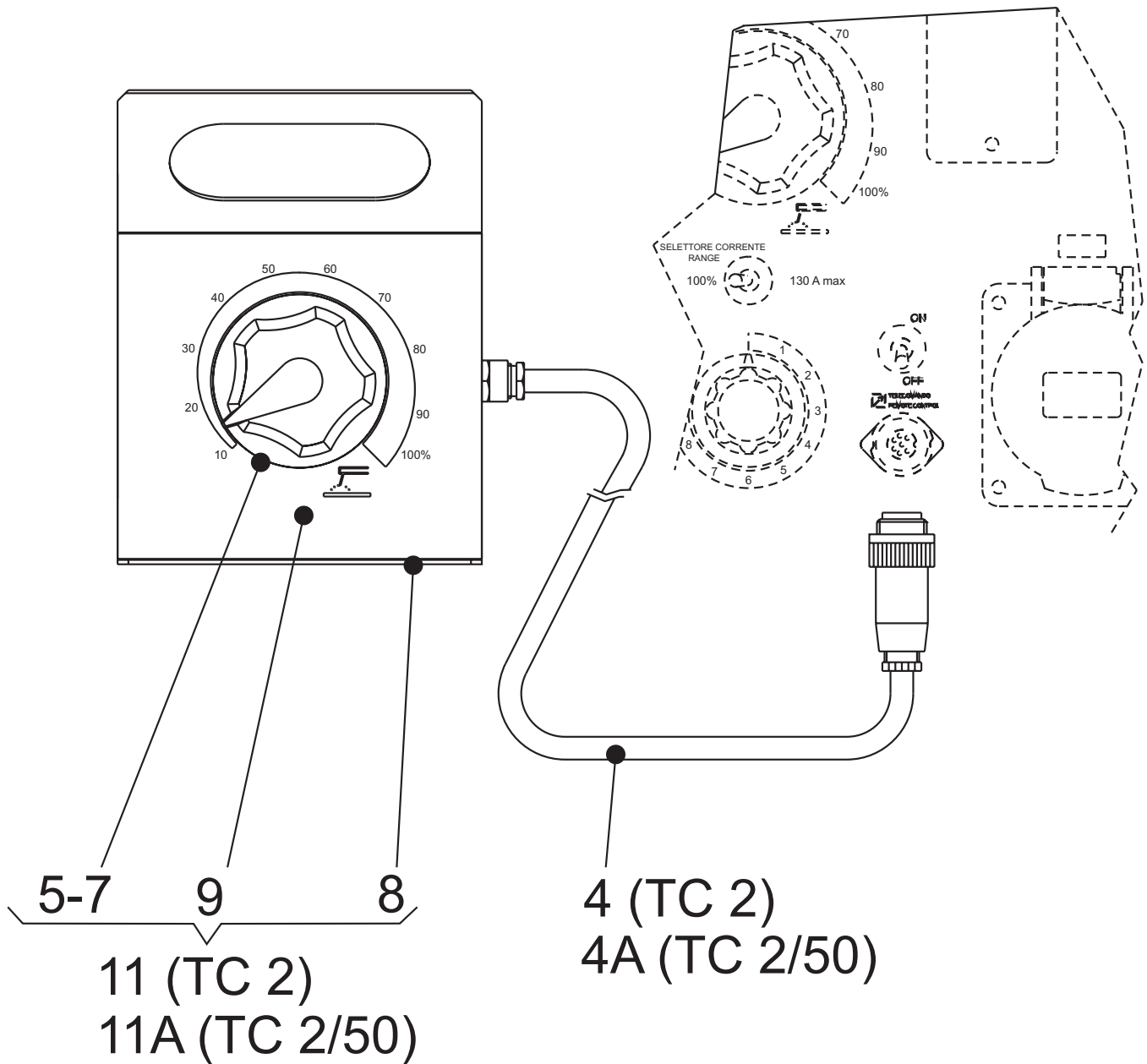
<i>Pos.</i>	<i>Rev. Cod.</i>	<i>Descr.</i>	<i>Note</i>
171	209718024	HINGE PIN	
172	209718121	COVER, ELECTRICAL BOX	
173	102302280	GASKET (L=MT.1)	
174	219930512	INLET WALL	
175	105112270	STRIP, SEALING (L=MT.1)	
176	209808065	SCREEN, AIR OUTLET	
177	102042870	SPRING	
178	209718073	TIE-ROD	
179	209718070	COVER	
180	219930513	COVER,ALTERNATOR	
181	209711100	ROLL BAR	
182	209508115	SUPPORT, AIR INLET WALL	
183	A 343339601	KNOB	Era 207509601
184	373008005	COVER (COMPL.)	
185	107300180	LATCH	
186	A 219828230	ENGINE INTAKE GRATE	
187	A 219828200	ENGINE INTAKE COVER	
188	209748100	FRONT COVER	
189	219938280	COVER UNIT	(EV)



<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>	



Pos. Cod.	Descr.	Note
4	209519904 CONNETTORE COMPLETO DI CAVI / CONNECTOR WITH CABLES	TC2 vers.
4a	930609904 CONNETTORE CON CAVI / CONNECTORS WITH CABLES	TC2/50 vers.
5	107509702 MANOPOLA REG. CORRENTE SALDAT. / KNOB, WELDING CURRENT REGULAT.	
7	107509700 POTENZIOMETRO / WELDING CURRENT REGULATOR	Fino a/ Up to REV. 10/99 - Del. 129/06 - 04/09/07
7	836709715 POTENZIOMETRO / WELDING CURRENT REGULATOR	Da/From REV. 07/07- Del. 129/06 - 04/09/07
8	107509900 SCATOLA / CASE, BOTTOM HALF	
9	209519901 COPERCHIO (CD) / COVER	
11	209510018 TC2 COMANDO DISTANZA STD / TC2 STD REMOTE CONTROL	
11a	930600018 TC2/50 COMANDO DISTANZA STD / TC2/50 STD REMOTE CONTROL	