GE 20000 LS/GS

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250209003 - GB

USE AND MAINTENANCE MANUAL
SPARE PARTS CATALOG

17/09/07 25020M00
preparato da UPT
approvato da DITE

IQNet
THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

IQNet and its partner
CISQ/ICIM
hereby certify that the organization

BCS S.p.A.

Head Office and Operative Unit: **Viale Mazzini, 161 - I-20081 Abbiategrasso (MI)**
(BCS – FERRARI – PASQUALI Trade Marks)
Operative Units
Via Valbrina, 17/19 - I-42045 Luzzara (RE) - (BCS – FERRARI – PASQUALI Trade Marks)
Viale Europa, 59 - I-20090 Cusago (MI) - (Mosa Trade Mark)

for the following field of activities

Design, production and servicing of tractors, agricultural and green maintenance machines.
Design, production and servicing of engine driven welders and generating sets.

has implemented and maintains a

Quality Management System

which fulfills the requirements of the following standard

ISO 9001:2000

Issued on: **2006-03-06**
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IQNet — *Fabio Roversi*, *President of IQNet*
CISQ — *Gianrenzo Prati*, *President of CISQ*

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CERTIFICATO n. 0192/4
CERTIFICATE No.

SI CERTIFICA CHE IL SISTEMA DI GESTIONE PER LA QUALITA' DI
WE HEREBY CERTIFY THAT THE QUALITY MANAGEMENT SYSTEM OPERATED BY

BCS S.p.A.

UNITA' OPERATIVE
OPERATIVE UNITS

Sede e Unità Operativa
Viale Mazzini, 161 - 20081 Abbiategrasso (MI)
(marchi BCS – FERRARI – PASQUALI)
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Viale Europa, 59 - 20090 Cusago (MI)
(marchio MOSA)
Italia

E' CONFORME ALLA NORMA
IS IN COMPLIANCE WITH THE STANDARD

UNI EN ISO 9001:2000

PER LE SEGUENTI ATTIVITA'
FOR THE FOLLOWING ACTIVITIES

EA: 18

Progettazione, produzione ed assistenza di trattori, macchine per agricoltura e manutenzione del verde. Progettazione, produzione ed assistenza di motosaldatrici e gruppi elettrogeni.

Design, production and servicing of tractors, agricultural and green maintenance machines. Design, production and servicing of engine driven welders and generating sets.

Riferirsi al Manuale della Qualità per l'applicabilità dei requisiti della Norma ISO 9001:2000.
Refer to Quality Manual for details of application to ISO 9001:2000 requirements.

Il presente certificato è soggetto al rispetto del regolamento per la certificazione dei sistemi di gestione per la qualità della azienda.
The use and the validity of this certificate shall satisfy the requirements of the rules for the certification of company quality management systems.

Data emissione *First issue*	Emissione corrente *Current issue*	Data di scadenza *Expiring date*
30/05/1994	06/03/2006	05/03/2009

ICIM S.p.A. – PIAZZA A. DIAZ, 2 – 20123 MILANO

SINCERT

CISQ è la Federazione Italiana di Organismi di Certificazione dei sistemi di gestione aziendale
CISQ is the Italian Federation of management system Certification Bodies

FEDERAZIONE CISQ
www.cisq.com

ICIM CISQ IQNet
ISO 9001:2000 - Cert. 0192

UNI EN ISO 9001 : 2000

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 actives 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

⚠ ATTENTION

This use and maintenance manual is an important part of the machines in question.
The assistance and maintenance personel 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).

MOSA

INFORMATION

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

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

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

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

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

NOTES ABOUT THE MANUAL

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

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

The manual for Use Maintenance and Spare Parts is an integrant part of the product. It must be kept with care during all the life of the product.
In case the machine and/or the set should be yielded to another user, this manual must also given to him.
Do not damage it, do not take parts away, do not tear pages and keep it in places protected from dampness and heat.

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

INFORMATION OF GENERAL TYPE

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

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

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

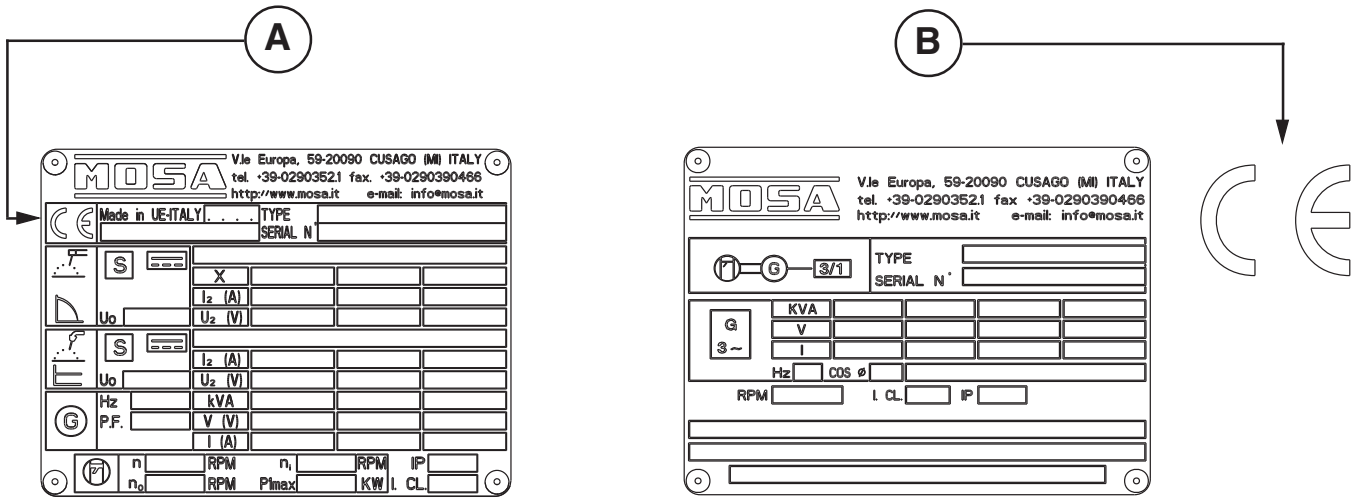
While working it is advisable to keep to the personal safety norms in force in the countries to which the product is destined (clothing, work tools, etc.).

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

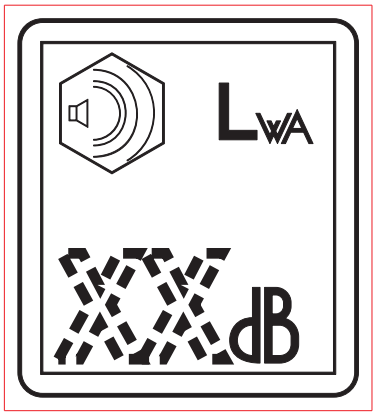
☞ ***Notice:** this manual does not engage MOSA, who keeps the faculty, apart the essential characteristics of the model here described and illustrated, to bring betterments and modifications to parts and accessories, without putting this manual uptodate immediately.*

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

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



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



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

The generating set GE 20000 is a unit which transforms the mechanical energy, generated by endothermic engine, into electric energy, through an alternator.

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

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

Technical data	GE 20000 LS/GS
A.C. GENERATOR	
Three-phase generation (stand-by)	18 kVA (14.4 kW)/ 400 V / 26 A
Single-phase generation (P.R.P.)	16 kVA (12.8 kW)/ 230 V / 23 A
Single-phase generation	9 kVA / 230 V / 39.1 A
Service	100 %
Insulating class	H
ALTERNATOR	self-excited, self-regulated, with brush
Type	synchronous, threephase
Frequency	50 Hz
ENGINE	
Mark / Model	Lombardini / 9LD625/2
Type / Cooling system	4 Stroke / air
Cylinders / Displacement	2 / 1250cm³
Output	19.1 kW (26 HP)
Speed	3000 rpm
Fuel / Fuel consumption	Diesel / 250 g/kWh
Engine oil capacity	2.8 l
Starter	Electric
GENERAL SPECIFICATIONS	
Battery	12V 60Ah
Tank capacity	26 l
Running time (75%)	7.5 h
Protection	IP 23
Dimensions/ max. (Lxlxh in mm) *	1456x841x880
Weight on base	386 Kg
Noise level	99 LWA (74 dB(A) - 7 m)

* Dimensions and weight are inclusive of all parts

OUTPUT

Declared power according to ISO 8528-1 (temperature 25°C, 30% relative humidity, altitude 100 m above sea level).
(*Stand-by) = maximum available power for use at variable loads for a yearly number of hours limited at 500 h. No overload is admitted.
(**Prime power P.R.P.) = maximum available power for use at variable loads for a yearly illimited number of hours. The average power to be taken during a period of 24 h must not be over 80% of the P.R.P.
It's admitted overload of 10% each hour every 12 h.
In an **approximative** way one reduces: of 1% every 100 m altitude and of 2.5% for every 5°C above 25°C.

ACOUSTIC POWER LEVEL

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

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

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

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

Lp a 1 meter = 95 dB(A) - 8 dB(A) = 87 dB(A)
Lp a 4 meters = 95 dB(A) - 20 dB(A) = 75 dB(A)
Lp a 7 meters = 95 dB(A) - 25 dB(A) = 70 dB(A)
Lp a 10 meters = 95 dB(A) - 28 dB(A) = 67 dB(A)

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

SYMBOLS IN THIS MANUAL

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

IMPORTANT ADVICE

- Advice to the User about the safety:

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

WARNING

Situations of danger - no harm to persons or things

Do not use without protective devices provided
Removing or disabling protective devices on the machine is prohibited.

Do not use the machine if it is not in good technical condition
The machine must be in good working order before being used. Defects, especially those which regard the safety of the machine, must be repaired before using the machine.

SAFETY PRECAUTIONS

DANGEROUS

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

WARNING

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

CAUTION

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

IMPORTANT

NOTE

ATTENTION

These headings refer to information which will assis 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* peaple.

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.

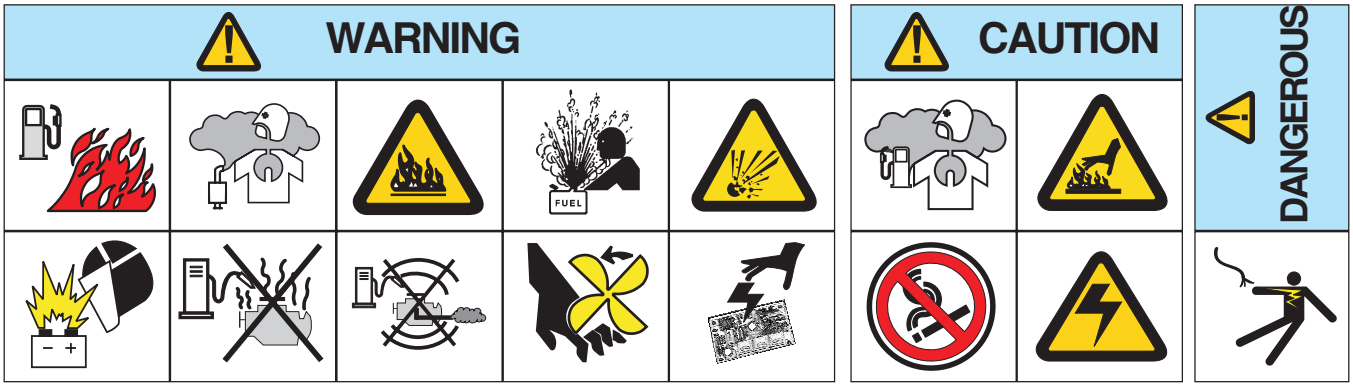
ENGINE	CHECKING BOARD
Stop engine when fueling	Do not touch electric devices if you are barefoot or with wet clothes.
Do not smoke, avoid flames, sparks or electric tools when fueling.	Always keep off leaning surfaces during work operations
Unscrew the cap slowly to let out the fuel vapours.	Static electricity can demage 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 shold 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.

EXTINCTION MEANS	
Appropriated	Carbonate anhydride (or carbon dioxyde) 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 inflamability point is very low.



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

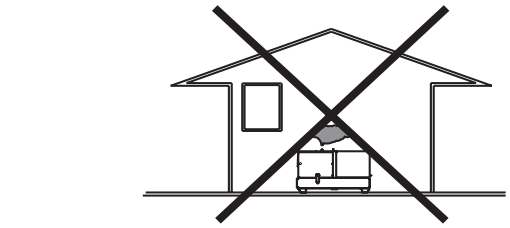
INSTALLATION AND ADVICE BEFORE USE

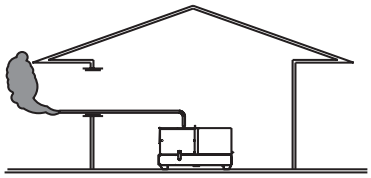
GASOLINE ENGINES

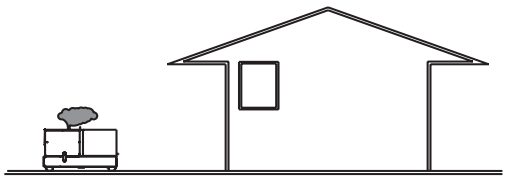
- Use in open space, air swept or vent exhaust gases, which contain the deathly carbone oxyde, far from the work area.

DIESEL ENGINES

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

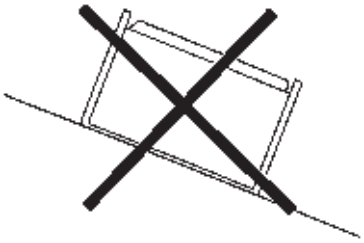




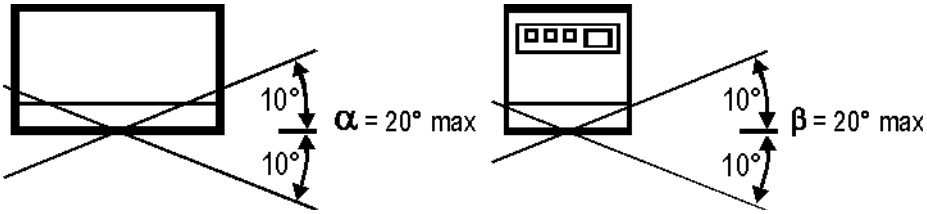


POSITION

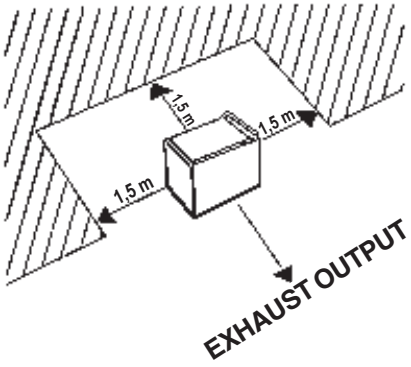
Place the machine on a level surface at a distance of at least 1,5 m from buildings or other plants.



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.

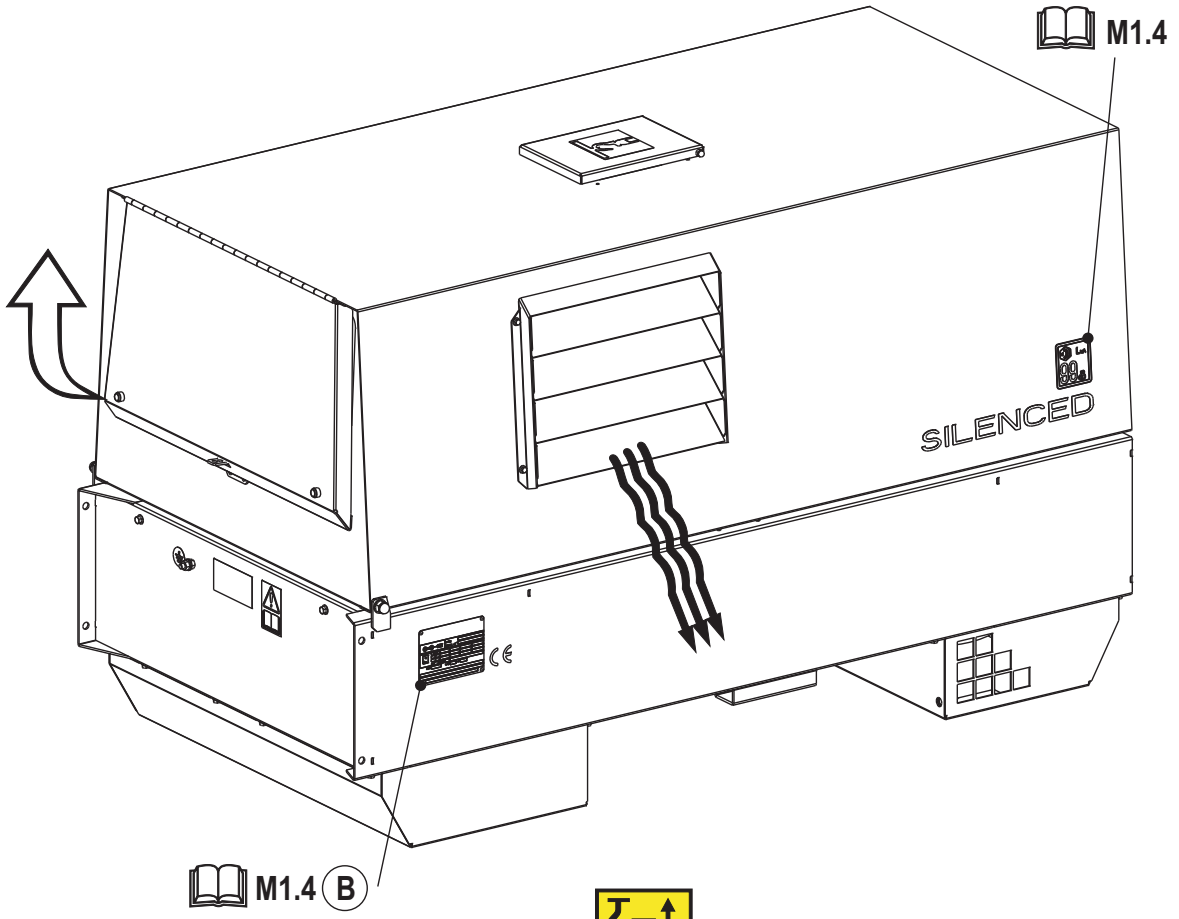
MOVES OF THE MACHINE

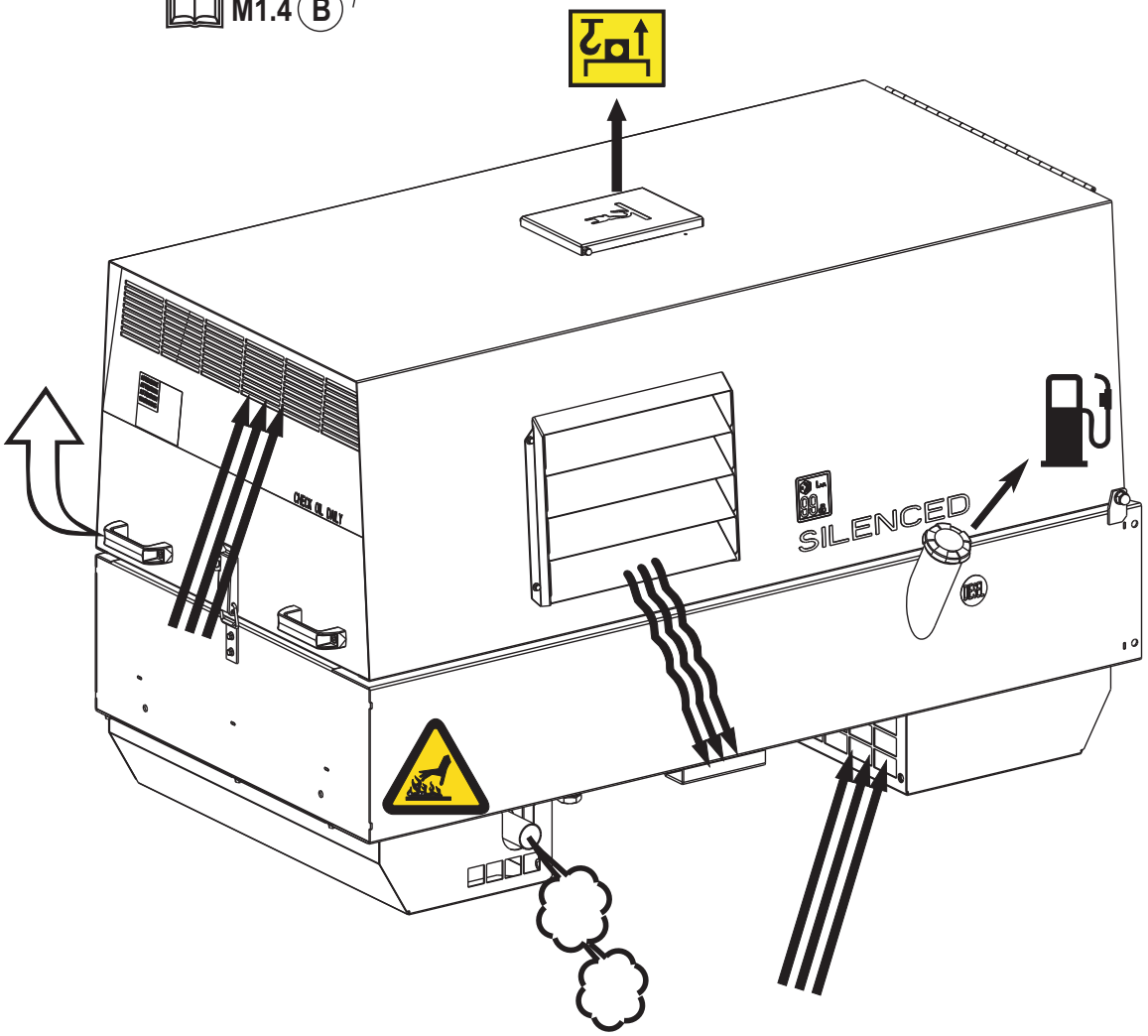
☞ At any move check that the engine is **off**, that there are no connections with cables which impede the moves.

PLACE OF THE MACHINE

ATTENTION

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





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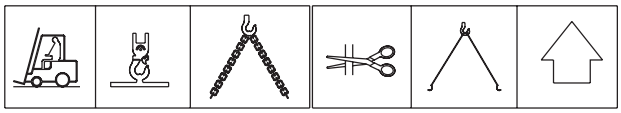
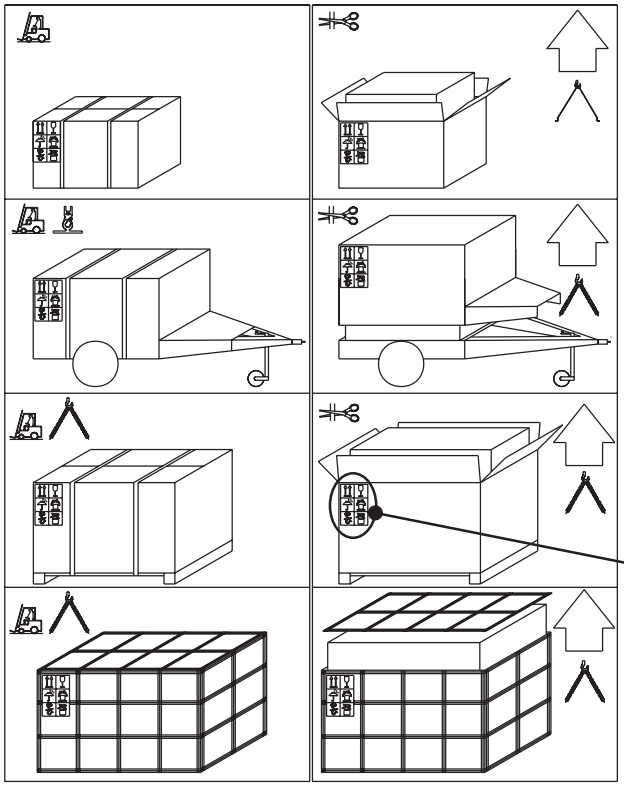


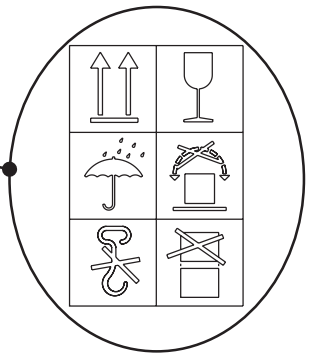


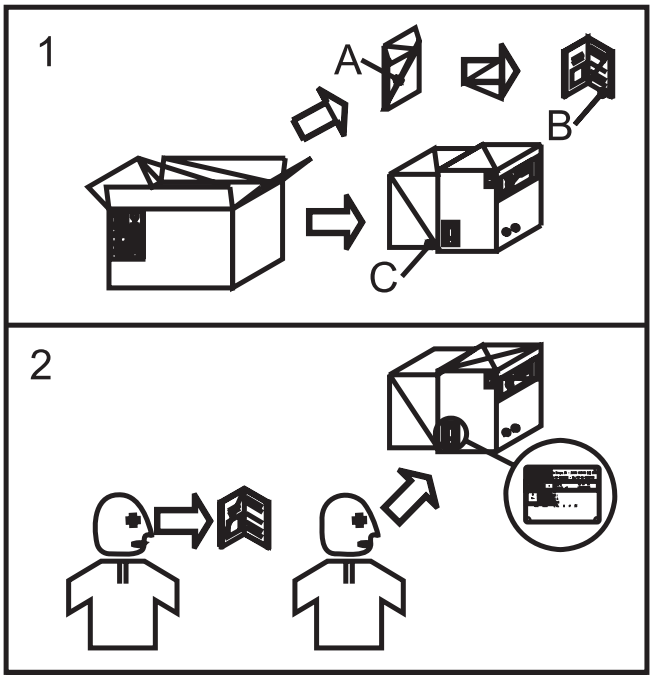
☞ Be sure that the lifting devices are: correctly mounted, adequate for the weight of the machine with it's packaging, and conforms to local rules and regulations.

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.

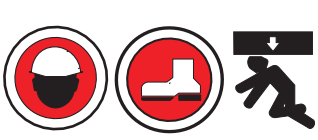
In case you find damages, rough handling or absence of parts (envelopes, manuals, etc.), we advise you to inform immediately our Technical Service.

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





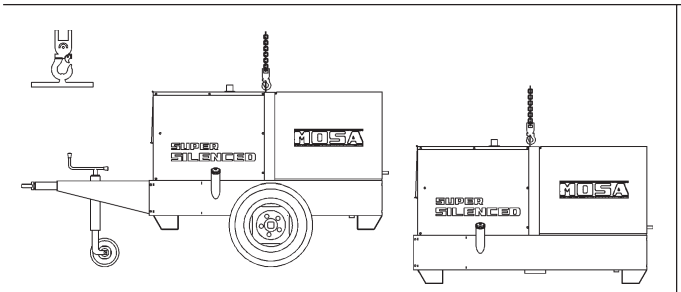
1) Take the machine (C) out of the shipment packing. Take out of the envelope (A) the user's manual (B).
2) Read: the user's manual (B), the plates fixed on the machine, the data plate.

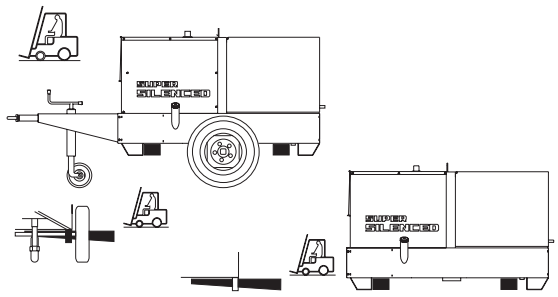


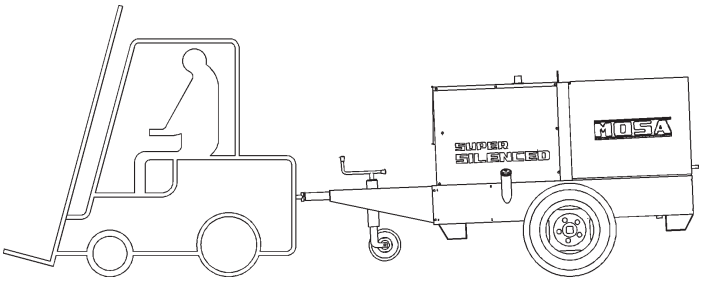
NOTE

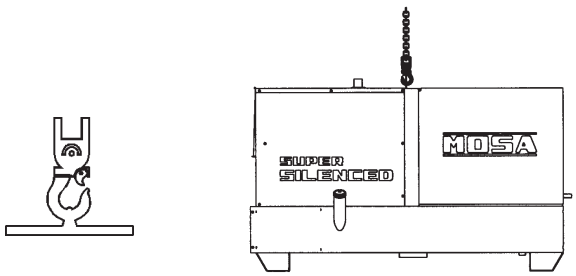
In case you should transport or move the machine, keep to the instructions as per the figures.
Make the transportation when the machine has **no** petrol in its tank, **no** oil in the engine and and electrolyte in the battery.
Be sure that the lifting devices are: correctly mounted, adequate for the 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.

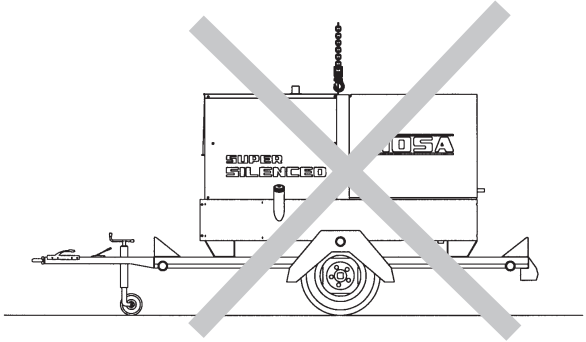






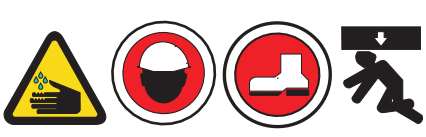


LIFT ONLY THE MACHINE



DO NOT LIFT THE MACHINE AND TRAILER

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



ATTENTION

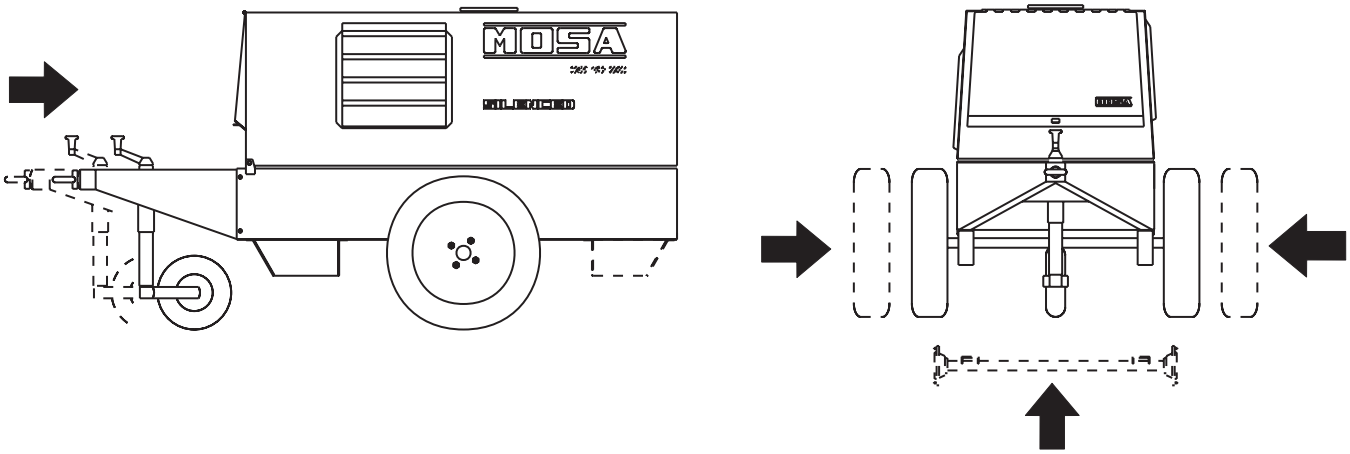
The CTL accessory cannot be removed from the machine and used separately (actioned manually or following vehicles) for the transport of loads or anyway for used different from the machine movements.

TRAILERS

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

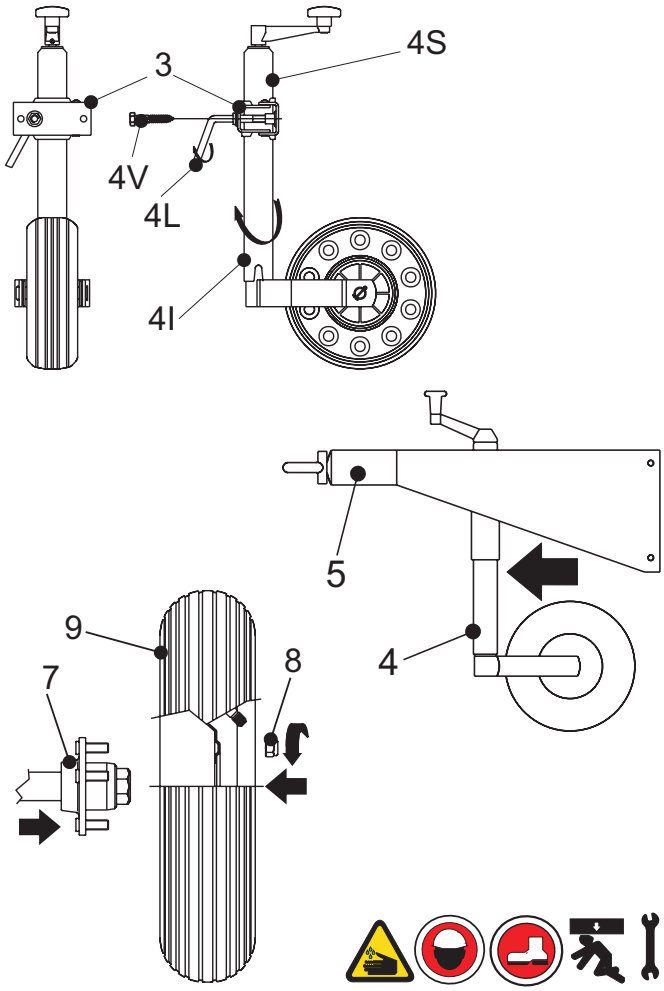
Towing on public roads or turnpikes of any type **IS EXCLUDED**, because **not** in possesion of the requirements by national and foreign traffic norms.

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



For assembling the generating set on the trolley CTL400 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 momentaneously 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 M6.2).
6) - Assemble the axle (7) to the base of the machine (see fig. page M6.2) with the M 10x20 screws and relative washers (two per part) so that their supports coincide.
8) - Insert the wheel (9) on the axle then screw the self blocking nuts (8).
9) - Pump the tyre (9) bringing the pressure to four atms.
10) - Lower the machine to the ground and place the parking foot definitively (regulating at the best height).



ATTENTION

Do not substitute the original tires with other types.

BATTERY 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.

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

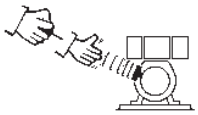
NOTE

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.

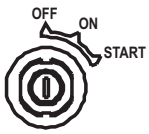


Then returning it slowly.

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.

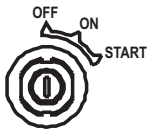
☞ **NB.: for safety reason the key must be kept by qualified personel.**

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 personel.

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 EMERCENCY 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 lood.

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.

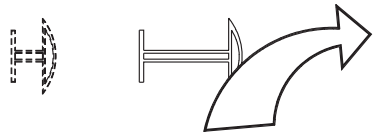
CAUTION

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

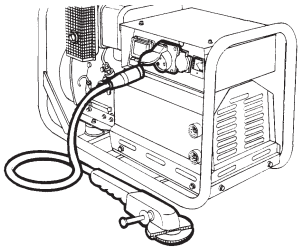
Before starting the engine, make sure that the emergency button (32B) is off (turn the button clockwise for this operation)



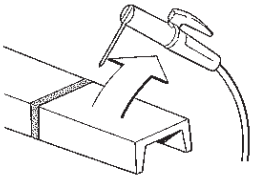
CAUTION

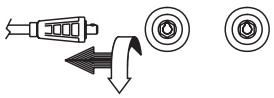
RUNNING-IN
During the first 50 hours of operation, do not use more than 60% of the maximum output power of the unit and check the oil level frequently, please follow the instructions on the engine use and maintenance manual..

☞ 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 personel.**

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 personel.**

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.

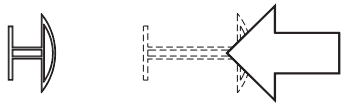
Press the pushbutton (F3) until the engine stops (where it is assembled).

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

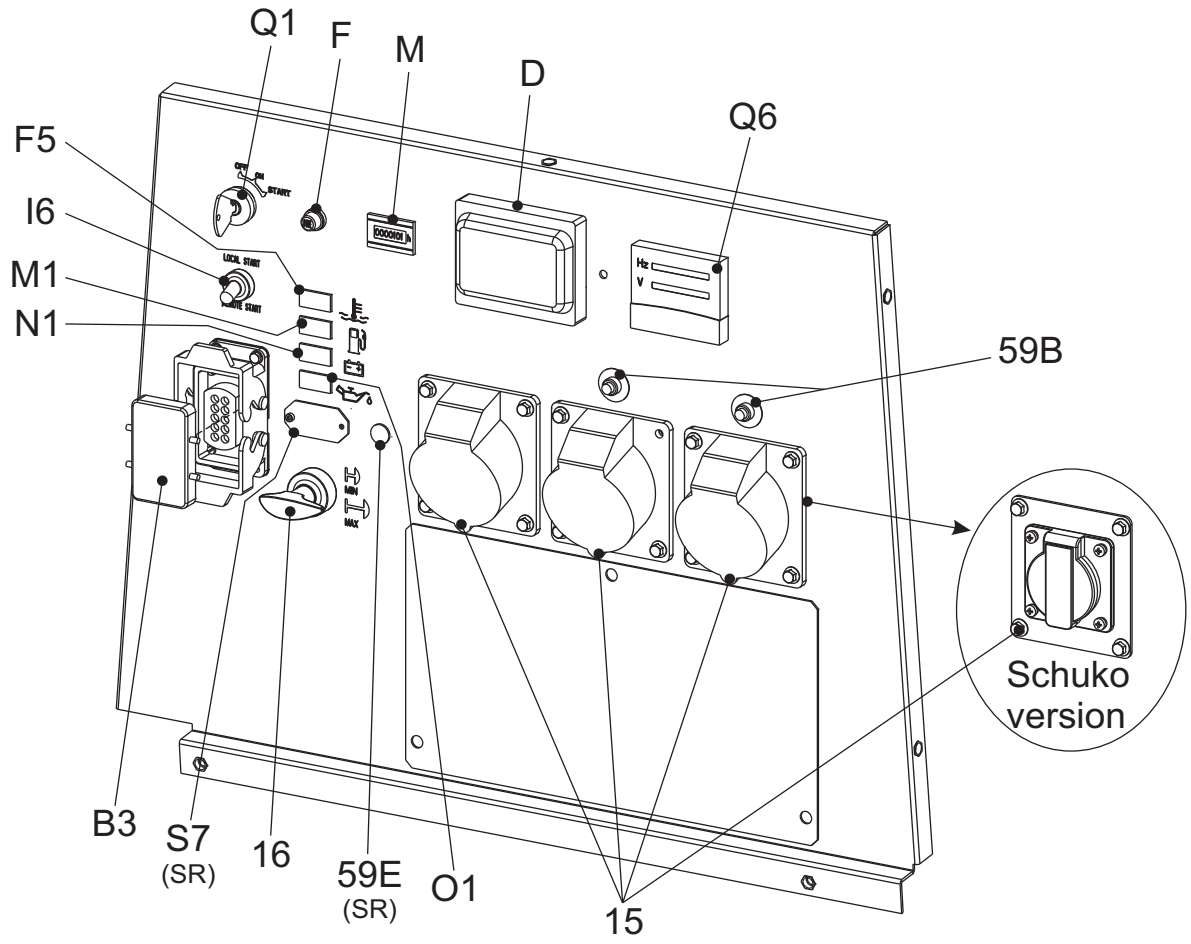
☞ **NB.: for safety reason the key must be kept by qualified personel.**

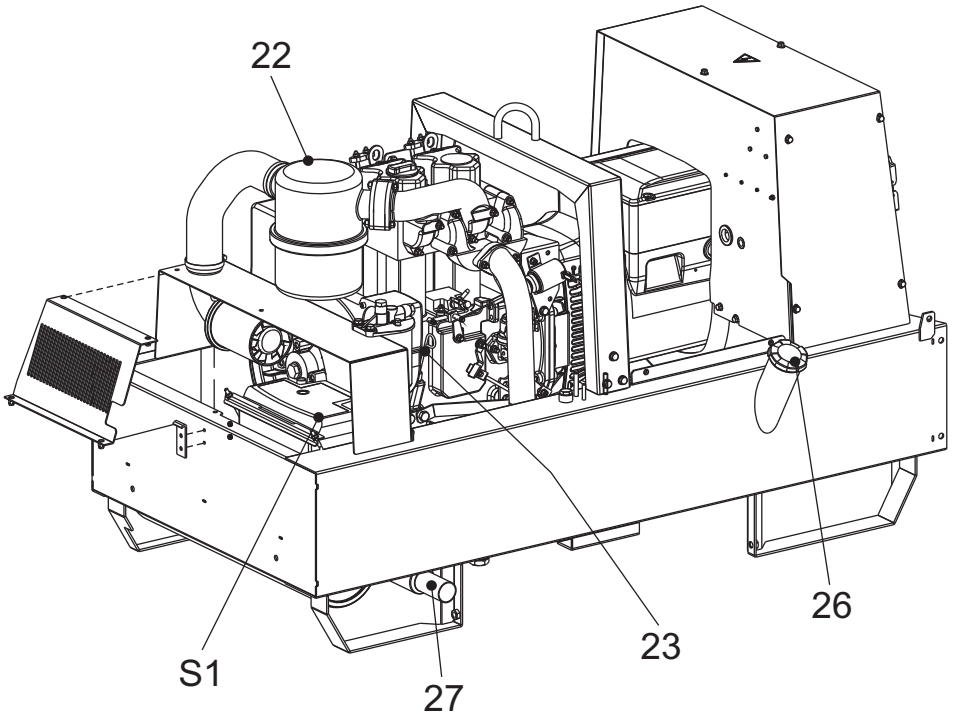
CAUTION

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
9 Welding socket (+)
10 Welding socket (-)
12 Earth terminal
15 A.C. socket
16 Accelerator lever
17 Feed pump
19 48V D.C. socket
22 Engine air filter
23 Oil level dipstick
24 Engine oil reservoir cap
24A Hydraulic oil reservoir cap
24B Water filling cap
25 Fuel prefilter
26 Fuel tank cap
27 Muffler
28 Stop control
29 Engine protection cover
30 Engine cooling/alternator fan belt
31 Oil drain tap
31A Hydraulic oil drain tap
31B Water drain tap
31C Exhaust tap for tank fuel
32 Button
33 Start button
34 Booster socket 12V
34A Booster socket 24V
35 Battery charge fuse
36 Space for remote control
37 Remote control
42 Space for E.A.S.
42A Space for PAC
47 Fuel pump
49 Electric start socket
54 Reset button PTO HI
55 Quick coupling m. PTO HI
55A Quick coupling f. PTO HI
56 Hydraulic oil filter
59 Battery charger thermal switch
59A Engine thermal switch
59B Aux current thermal switch
59C Supply thermal switch wire feeder-42V
59D Pre-heater (spark plug) thermal switch
59E Supply thermal switch oil/water heather
59F Electropump thermal switch
63 No load voltage control
66 Choke control
67A Auxiliary / welding current control
68 Cellulosic electrodes control
69A Voltmeter relay
70 Warning lights
71 Selecting knob
72 Load commut. push button
73 Starting push button
74 Operating mode selector
75 Power on warning light
76 Display
79 Wire connection unit
86 Selector
86A Setting confirmation
87 Fuel valve
88 Oil syringe
A3 Insulation monitoring
A4 Button indicating light 30 l/1' PTO HI
B2 Engine control unit EP2
B3 E.A.S. connector
B4 Exclusion indicating light PTO HI
B5 Auxiliary current push button
C2 Fuel level light
C3 E.A.S. PCB
C6 Control unit for generating sets QEA
D Ground fault interrupter (30 mA)
D1 Engine control unit and economiser EP1
D2 Ammeter
E2 Frequency meter
F Fuse
F3 Stop switch
F5 Warning light, high temperature
F6 Arc-Force selector
G1 Fuel level transmitter
H2 Voltage commutator
H6 Fuel electro pump
H8 Engine control unit EP7
I2 48V A.C. socket
I3 Welding scale switch
I4 Preheating indicator
I5 Y/▲ switch
I6 Start Local/Remote selector
I8 AUTOIDLE switch
L A.C. output indicator
L5 Emergency button
L6 Choke button
M Hour counter
M1 Warning level light
M2 Contactor
M5 Engine control unit EP5
M6 CC/CV switch
N Voltmeter
N1 Battery charge warning light
N2 Thermal-magnetic circuit breaker/ Ground fault interrupter
N5 Pre-heat push-button
N6 Connector - wire feader
O1 Oil pressure warning light/Oil alert
P Welding arc regulator
Q1 Starter key
Q3 Derivation box
Q4 Battery charge sockets
Q7 Welding selector mode
R3 Siren
S Welding ammeter
S1 Battery
S3 Engine control unit EP4
S6 Wire feeder supply switch
S7 Plug 230V singlephase
T Welding current regulator
T4 Dirty air filter warning light/indicator
T5 Earth leakage relay
T7 Analogic instrument V/Hz
U Current trasformer
U3 R.P.M. adjuster
U4 Polarity inverter remote control
U5 Relase coil
U7 Engine control unit EP6
V Welding voltage voltmeter
V4 Polarity inverter control
V5 Oil pressure indicator
W1 Remote control switch
W3 Selection push button 30 l/1' PTO HI
W5 Battery voltmeter
X1 Remote control socket
Y3 Button indicating light 20 l/1' PTO HI
Y5 Commutator/switch, serial/parallel
Z2 Thermal-magnetic circuit breaker
Z3 Selection push button 20 l/1' PTO HI
Z5 Water temperature indicator


Q1
F
M
D
Q6
F5
I6
M1
N1
59B
Schuko
version
B3
S7
(SR)
16
59E
(SR)
O1
15


22
S1
27
23
26

WARNING

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

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

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

GENERATION IN AC (ALTERNATING CURRENT)

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

Check that the electrical specifications for the units to be powered - voltage, power, frequency - are compatible with those of the generator. Values that are too high or too low for voltage and frequency can damage electrical equipment irreparably.
In some cases, for the powering of three-phase loads, it is necessary to ensure that the cyclic direction of the phases corresponds to the installation's requirements.

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

Before starting up the group, make certain no dangerous situations exist on the installation to be powered.
Check that the thermal-magnetic switch (Z2) is in the OFF position (input lever in downward position).

Start up the electricity-generating group, positioning the thermal-magnetic switch (Z2) and differential switch (D) to ON (input lever in upward position).
Before powering on the utilities, check that the voltmeter (N) and frequency meter (E2) indicate nominal values; in addition, check on the voltmeter change-over switch (H2) (where it is assembled) that the three line voltages are the same.
☞ In the absence of a load, the values for voltage and frequency can be greater than their nominal values. See sections on VOLTAGE and FREQUENCY.

OPERATING CONDITIONS

POWER

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

There are various types of power: PRIME POWER (PRP), STAND-BY POWER established by ISO 8528-1 and 3046/1 Norms, and their definitions are listed in the manual's TECHNICAL SPECIFICATIONS page.

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

VOLTAGE

GENERATORS WITH COMPOUND SETTING.

In these types of generators, the no-load voltage is generally greater than 3–5% with respect to its nominal value; f.e. for nominal voltage, threephase 400Vac or singlephase 230Vac, the no-load voltage can be comprised between 410-420V (threephase) and 235-245V (singlephase). The precision of the load voltage is maintained within ±5% with balanced loads and with a rotation speed variation of 4%. Particularly, with resistive loads (cos φ = 1), a voltage over-elevation occurs which, with the machine cold and at full load, can even attain +10 %, a value which in any case is halved after the first 10-15 minutes of operation.
The insertion and release of the full load, under constant rotation speed, provokes a transitory voltage variation that is less than 10%; the voltage returns to its nominal value within 0.1 seconds.

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

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

FREQUENCY

The frequency is a parameter that is directly dependent on the motor's rotation speed. Depending on the type of alternator, 2 or 4 pole, we will have a frequency of 50/60 Hz with a rotation speed of 3000/3600 or 1500/1800 revolutions per minute.
The frequency, and therefore the number of motor revolutions, is maintained constant by the motor's speed regulation system.
Generally, this regulator is of a mechanical type and presents a droop from no-load to nominal load which is less than 5 % (static or droop), while under static conditions precision is maintained within ±1%.Therefore, for generators at 50Hz the no-load frequency can be 52–52.5 Hz, while for generators at 60Hz the no-load frequency can be 62.5-63Hz.

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

POWER FACTOR - COS φ

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

START-UP OF ASYNCHRONOUS MOTORS

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

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

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

SINGLE-PHASE LOADS

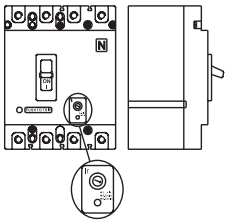
Power to monophase utilities by means of three-phase generators requires some operating limitations.

- In single-phase operation, the declared voltage tolerance can no longer be maintained by the regulator (compound or electronic regulator), since the system becomes highly unbalanced. **The voltage variation on the phases not affected by the power can prove dangerous; we recommend sectioning the other loads eventually connected**.
- The maximum power which can be drawn between Neutral and Phase (start connection) is generally 1/3 of the nominal three-phase power; some types of alternators even allow for 40%. Between two Phases (triangle connection) the maximum power cannot exceed 2/3 of the declared three-phase power.
- In electricity-generating groups equipped with monophase sockets, use these sockets for connecting the loads. In other cases, always use the "R" phase and Neutral.

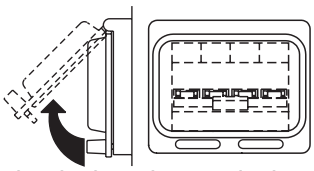
ELECTRIC PROTECTIONS

THERMAL-MAGNETIC SWITCH

The electricity-generating group is protected against short-circuits and against overloads by a thermal-magnetic switch (Z2) situated upstream from the installation. Operating currents, both thermic and magnetic, can be fixed or adjustable in relation to the switch model.
☞ In models with adjustable operating current **do not modify** the settings, since doing so can compromise the installation's protection or the electricity-generating group's output characteristics. For eventual variations, contact our Technical Service Department.



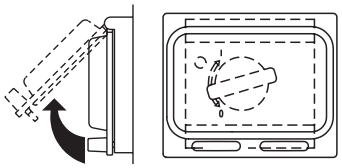
The intervention of the protection feature against overloads is not instantaneous, but follows a current overload/time outline; the greater the overload the less the intervention.
Furthermore, keep in mind that the nominal operating current refers to an operating temperature of 30°C, so that each variation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

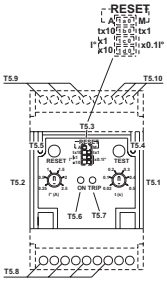


In case of an intervention on the part of the thermal magnetic protection device, check that the total absorption does not exceed the electricity-generating group's nominal current.

DIFFERENTIAL SWITCH

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





power to the circuit connected.

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

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

THERMIC PROTECTION

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

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

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

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

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

ATTENTION

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

USAGE WITH EAS AUTOMATIC START-UP PANEL

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

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

- ❑ Perform connections on the installation in safety conditions. Position the automatic panel in RESET or LOCKED mode.
- ❑ Carry out the first start-up in MANUAL mode.
  Check that the generator's LOCAL START / REMOTE START switch (I6) is in the REMOTE position.
  Check that the generator switches are enabled (input lever in upward position).
  Position the EAS panel in manual mode by pressing MAN. key, and only after having checked that there are no dangerous situations, press the START key to start the electricity-generating group.
- ❑ During the operation of the generator, all controls and signals from both the automatic panel and group are enabled; it is therefore possible to control its operation from both positions.
  In case of an alarm with a shutdown of the motor (low pressure, high temperature, etc.), the automatic panel will indicate the malfunction that has caused the stoppage, while the generator's front panel will be disabled and will no longer supply any information.

MAKE SURE

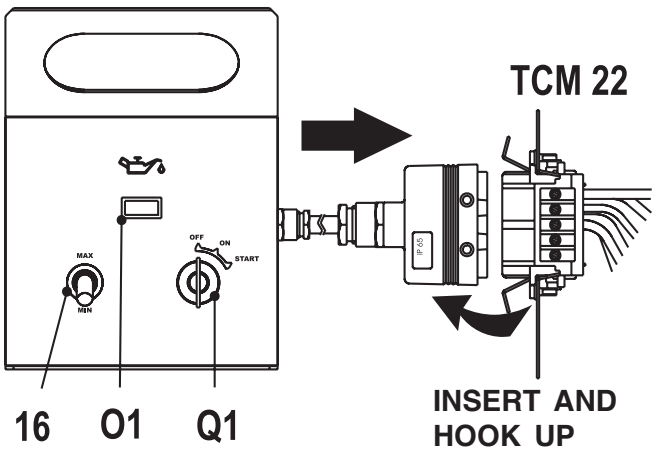
➔ *When the TCM 22-40 is used, it is not possible to connect the E.A.S automatic intervention unit.*
➔ The selector LOCAL START/REMOTE START (I6) of the generating set must be switched on REMOTE START.

USE OF THE REMOTE CONTROL TCM 22

The coupling of the TCM 22 with the generating set, ready for remot starting, permits to work far from the set itself.
The remote control is connected to the front plate, and/or rear plate, with a multiple connector.

The TCM 22 assures the following fonctions:
- starting (starting key Q1)
- acceleration (selector 16)
- stop (starting key Q1)
- indication of oil low pressure (warning light O1)

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



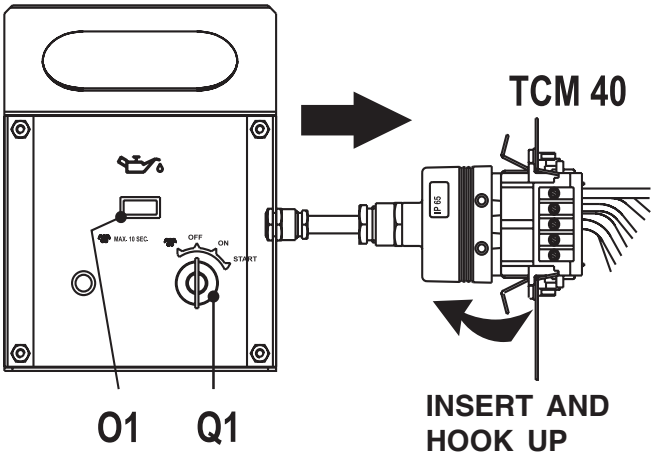
USE OF THE REMOTE CONTROL TCM 40

The coupling of the TCM 40 with the generating set, ready for remot starting, permits to work far from the set itself.
The remote control is connected to the front plate, and/or rear plate, with a multiple connector.

The TCM 40 assures the following fonctions:

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

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



ENGINE PROTECTION (ES - EV)

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

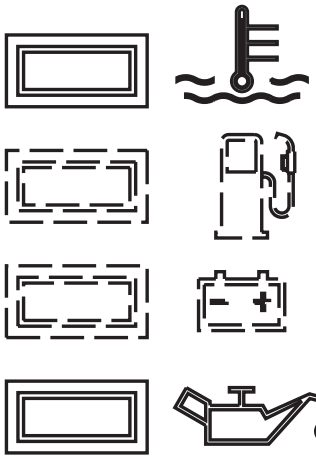
The system consist of electronic card of control and check, and of an engine stop device: solenoid (**E**lettro**S**top), electrovalve (**E**lettro**V**alvola)

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.



High temperature

Low oil pressure

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

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

WARNING

MOVING PARTS can injure

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

- See pag. M1.1 -

HOT surface can hurt you

NOTE

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

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

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

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

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

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

IMPORTANT

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

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 suppplied 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

NOTE

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

ATTENTION

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

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

MAINTENANCE GENERATING SET WITH AUTOMATIC BOARD

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

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

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

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

GASOLINE ENGINE

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

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

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

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

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

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

Protect the machine with a plastic hood and store it in o 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 soles 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 surroindings, 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 inflamable 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.

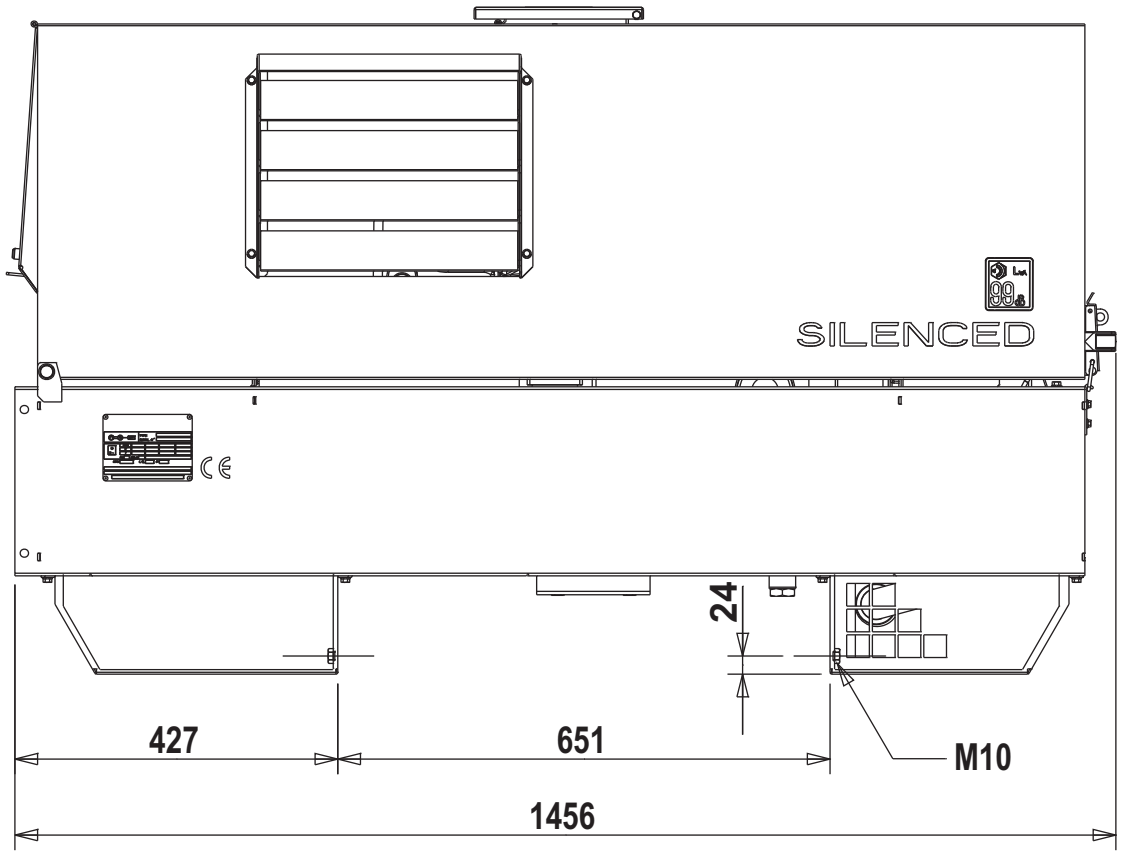
In case the machine should be cust off without any previous disassembly it is however compulsory to remove:
- tank fuel
- engine lubricating oil
- cooling liquid from the engine
- battery

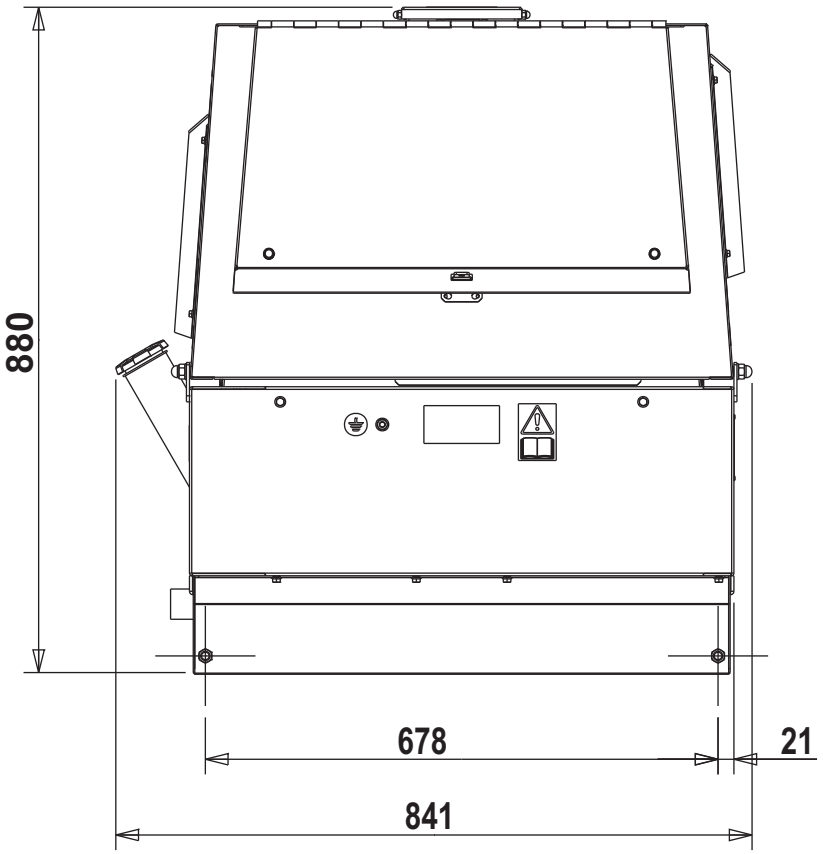
NOTE: MOSA is involved with custing off the machine **only** for the second hand ones, when not reparable.
This, of course, after authorization.

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 surroindings, health or safety respecting completely the laws and/or dispositions in force in the place.





A: Alternator
B: Wire connection unit
C: Capacitor
D: G.F.I.
E: Welding PCB transformer
F: Fuse
G: 400V 3-phase socket
H: 230V 1phase socket
I: 110V 1-phase socket
L: Socket warning light
M: Hour-counter
N: Voltmeter
P: Welding arc regulator
Q: 230V 3-phase socket
R: Welding control PCB
S: Welding current ammeter
T: Welding current regulator
U: Current transformer
V: Welding voltage voltmeter
Z: Welding sockets
X: Shunt
W: D.C. inductor
Y: Welding diode bridge

A1: Arc striking resistor
B1: Arc striking circuit
C1: 110V D.C./48V D.C. diode bridge
D1: E.P.1 engine protection
E1: Engine stop solenoid
F1: Acceleration solenoid
G1: Fuel level transmitter
H1: Oil or water thermostat
I1: 48V D.C. socket
L1: Oil pressure switch
M1: Fuel warning light
N1: Battery charge warning light
O1: Oil pressure warning light
P1: Fuse
Q1: Starter key
R1: Starter motor
S1: Battery
T1: Battery charge alternator
U1: Battery charge voltage regulator
V1: Solenoid valve control PCBT
Z1: Solenoid valve
W1: Remote control switch
X1: Remote control and/or wire feeder socket
Y1: Remote control plug

A2: Remote control welding regulator
B2: E.P.2 engine protection
C2: Fuel level gauge
D2: Ammeter
E2: Frequency meter
F2: Battery charge trasformer
G2: Battery charge PCB
H2: Voltage selector switch
I2: 48V a.c. socket
L2: Thermal relay
M2: Contactor
N2: G.F.I. and circuit breaker
O2: 42V EEC socket
P2: G.F.I. resistor
Q2: T.E.P. engine protection
R2: Solenoid control PCBT
S2: Oil level transmitter
T2: Engine stop push-button T.C.1
U2: Engine start push-buttonT.C.1
V2: 24V c.a. socket
Z2: Thermal magnetic circuit breaker
W2: S.C.R. protection unit
X2: Remote control socket
Y2: Remote control plug

A3: Insulation moitoring
B3: E.A.S. connector
C3: E.A.S. PCB
D3: Booster socket
E3: Open circuit voltage switch
F3: Stop push-button
G3: Ignition coil
H3: Spark plug
I3: Range switch
L3: Oil shut-down button
M3: Battery charge diode
N3: Relay
O3: Resistor
P3: Sparkler reactor
Q3: Output power unit
R3: Electric siren
S3: E.P.4 engine protection
T3: Engine control PCB
U3: R.P.M. electronic regulator
V3: PTO HI control PCB
Z3: PTO HI 20 l/min push-button
W3: PTO HI 30 l/min push-button
X3: PTO HI reset push-button
Y3: PTO HI 20 l/min indicator

A4: PTO HI 30 l/min indicator
B4: PTO HI reset indicator
C4: PTO HI 20 l/min solenoid valve
D4: PTO HI 30 l/ min solenoid valve
E4: Hydraulic oil pressure switch
F4: Hycraulic oil level gauge
G4: Preheating glow plugs
H4: Preheating gearbox
I4: Preheating indicator
L4: R.C. filter
M4: Heater with thermostat
N4: Choke solenoid
O4: Step relay
P4: Circuit breaker
Q4: Battery charge sockets
R4: Sensor, cooling liquid temperature
S4: Sensor, air filter clogging
T4: Warning light, air filter clogging
U4: Polarity inverter remote control
V4: Polarity inverter switch
Z4: Transformer 230/48V
W4: Diode bridge, polarity change
X4: Base current diode bridge
Y4: PCB control unit, polarity inverter

A5: Base current switch
B5: Auxiliary push-button ON/OFF
C5: Accelerator electronic control
D5: Actuator
E5: Pick-up
F5: Warning light, high temperature
G5: Commutator auxiliary power
H5: 24V diode bridge
I5: Y/s commutator
L5: Emergency stop button
M5: Engine protection EP5
N5: Pre-heat push-button
O5: Accelerator solenoid PCB
P5: Oil pressure switch
Q5: Water temperature switch
R5: Water heater
S5: Engine connector 24 poles
T5: Electronic GFI relais
U5: Release coil, circuit breaker
V5: Oil pressure indicator
Z5: Water temperature indicator
W5: Battery voltmeter
X5: Contactor, polarity change
Y5: Commutator/switch, series/parallel

A6: Commutator/switch
B6: Key switch, on/off
C6: QEA control unit
D6: Connector, PAC
E6: Frequency rpm regulator
F6: Arc-Force selector
G6: Device starting motor
H6: Fuel electro pump 12V c.c.
I6: Start Local/Remote selector
L6: Choke button
M6: Switch CC/CV
N6: Connector – wire feeder
O6: 420V/110V 3-phase transformer
P6: Switch IDLE/RUN
Q6: Hz/V/A analogic instrument
R6: EMC filter
S6: Wire feeder supply switch
T6: Wire feeder socket
U6: DSP chopper PCB
V6: Power chopper supply PCB
Z6: Switch and leds PCB
W6: Hall sensor
X6: Water heather indicator
Y6: Battery charge indicator

A7: Transfer pump selector AUT-0-MAN
B7: Fuel transfer pump
C7: „GECO“ generating set test
D7: Flooting with level switches
E7: Voltmeter regulator
F7: WELD/AUX switch
G7: Reactor, 3-phase
H7: Switch disconnector
I7: Solenoid stop timer
L7: "VODIA" connector
M7: "F" EDC4 connector
N7: OFF-ON-DIAGN. selector
O7: DIAGNOSTIC push-button
P7: DIAGNOSTIC indicator
Q7: Welding selector mode
R7: R.C. net
S7: 230V 1-phase plug
T7: V/Hz analogic instrument
U7: Engine protection EP6
V7: G.F.I. relay supply switch
Z7: Radio remote control receiver
W7: Radio remote control trasnsmitter
X7: Isometer test push-button
Y7: Remote start socket

A8: Transfer fuel pump control
B8: Ammeter selector switch
C8: 400V/230V/115V commutator
D8: 50/60 Hz switch
E8: Cold start advance with temp. switch
F8: START/STOP switch
G8: Polarity inverter two way switch
H8: Engine protection EP7
I8: AUTOIDLE switch
L8: AUTOIDLE PCB
M8:
N8:
O8:
P8:
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R8:
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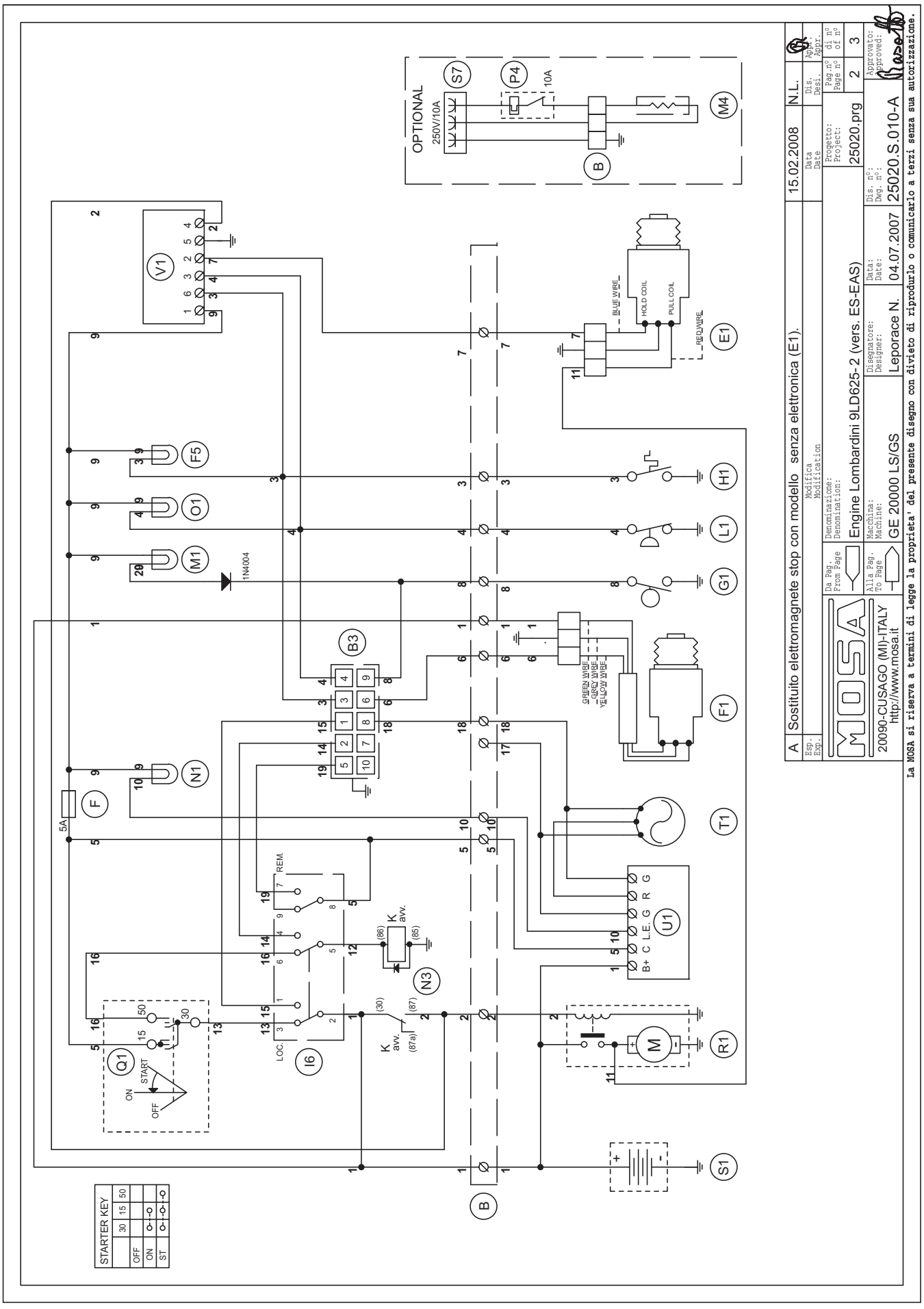
V8:
Z8:
W8:
X8:
Y8:



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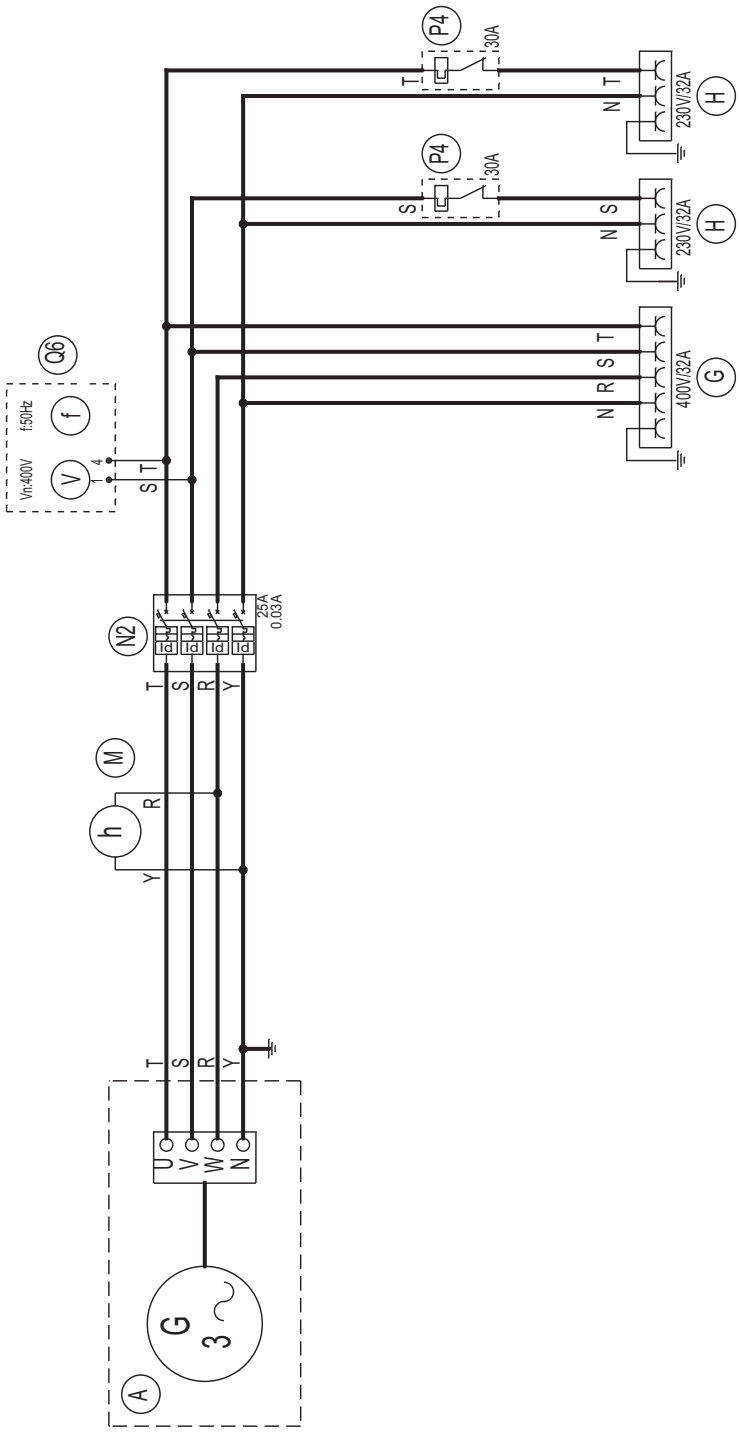

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http://www.mosa.it
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Modifica: Modification
Denominazione: Denomination:
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Progetto: Project:
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Dis. n.°: Dwg. n.°:
25020.S.020
Dis. Desi.
Pag.n° Page n°
3
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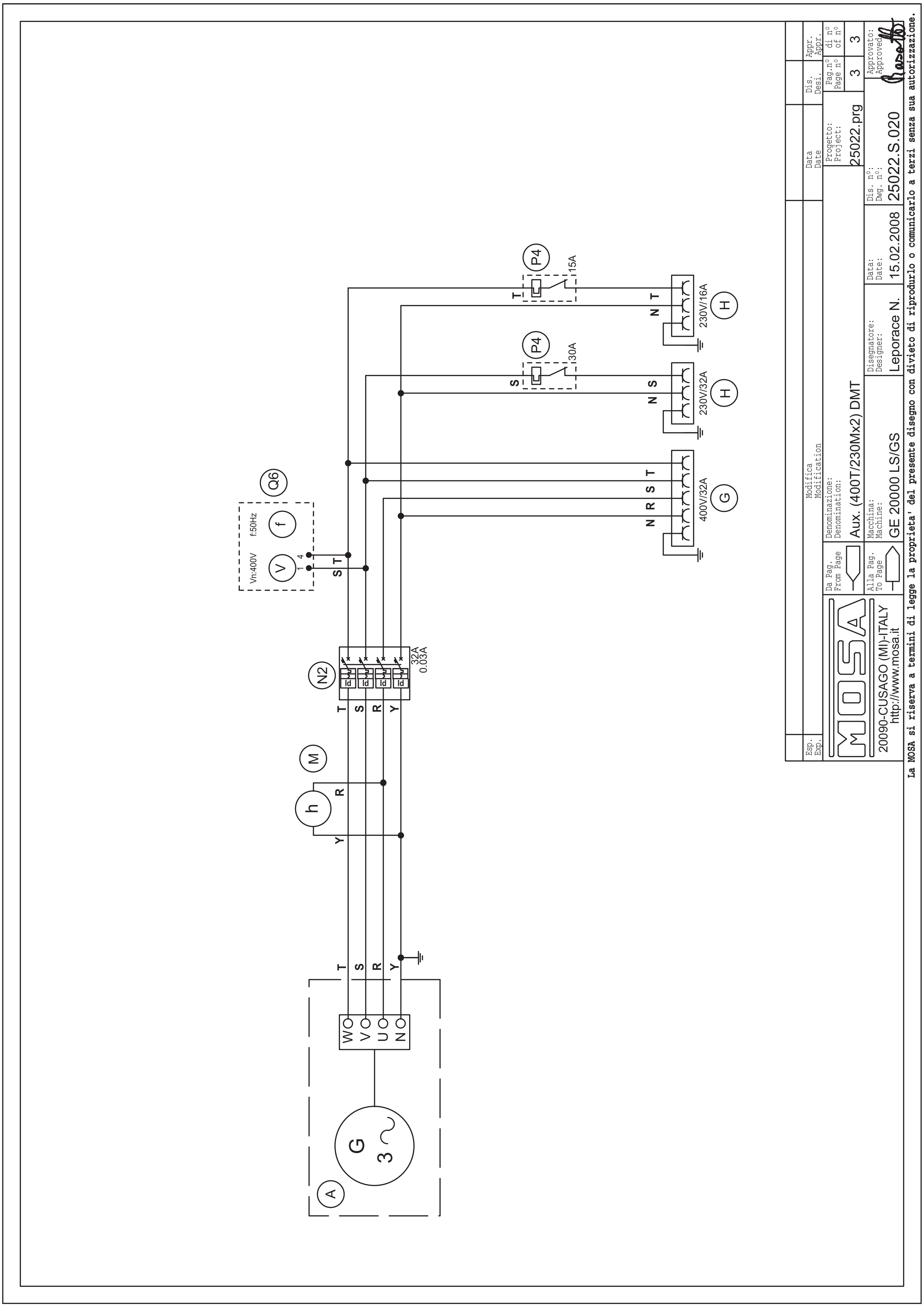
Appr. Appr.
di n° of n°
Approvato: Approved:


A
G 3~
W V U N
T S R Y
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h
R Y
N2
Id Id Id Id
32A 0.03A
Q6
Vn:400V f:50Hz
V f
1 4
S T
P4
15A
30A
N T
230V/16A
H
N S
230V/32A
N R S T
400V/32A
G
Esp. Exp.
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Data Date
Dis. Desi.
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Da Pag. From Page
Alla Pag. To Page
Denominazione: Denomination:
Aux. (400T/230Mx2) DMT
Progetto: Project:
25022.prg
Pag.n° Page n°
3
di n° of n°
3
Macchina: Machine:
GE 20000 LS/GS
Disegnatore: Designer:
Leporace N.
Data: Date:
15.02.2008
Dis. n°: Dwg. n°:
25022.S.020
Approvato: Approved:
20090-CUSAGO (MI)-ITALY
http://www.mosa.it
La MOSA si riserva a termini di legge la proprieta' del presente disegno con divieto di riprodurlo o comunicarlo a terzi senza sua autorizzazione.
17/09/07 25020-I

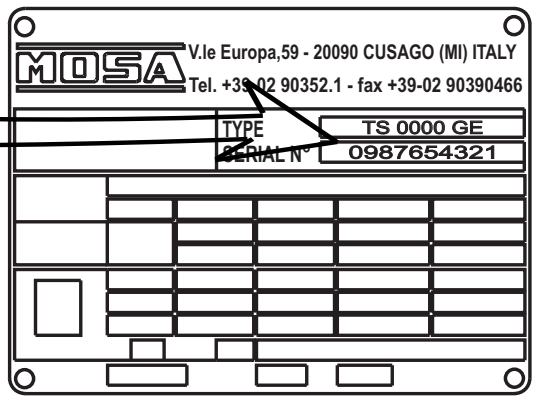
MOSA guarantees that any request for spare parts will be satisfied.

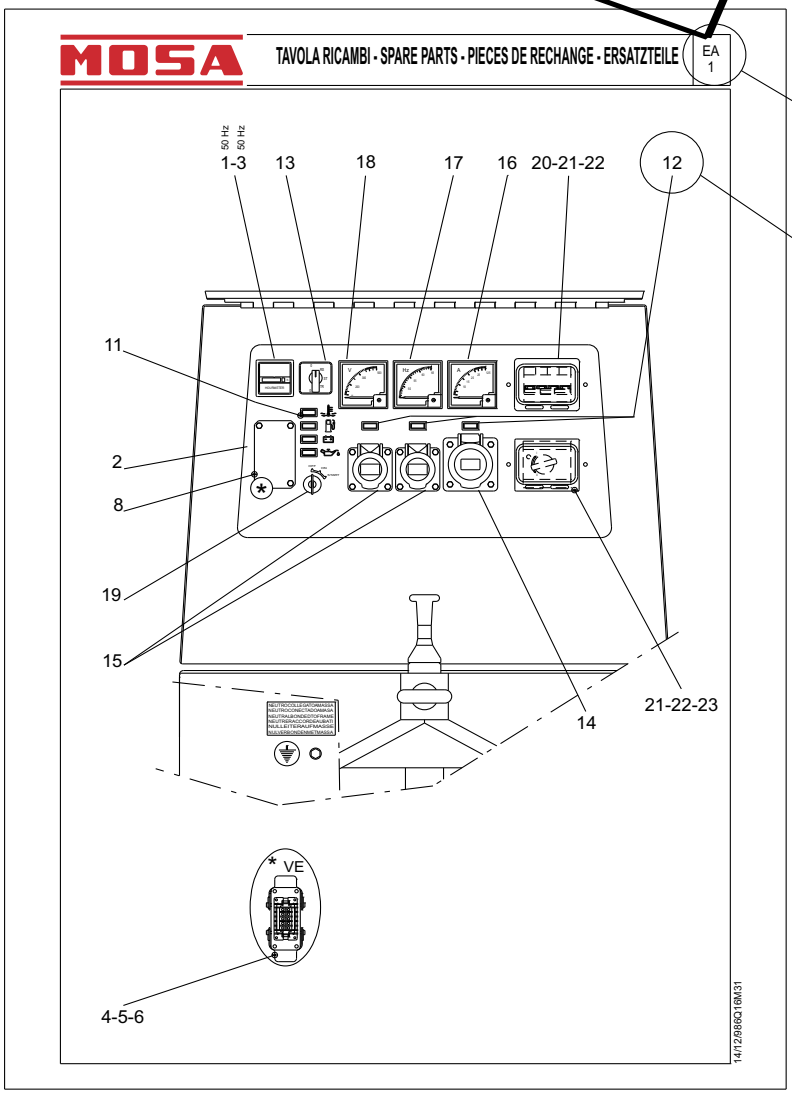
To keep the machine in full working order, when replacement of MOSA spare parts is required, always ask for genuine parts only.

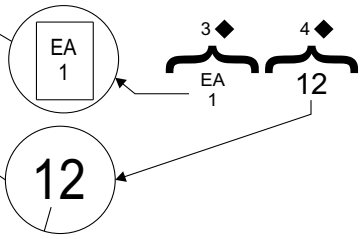
☞ The requested data are to be found on the data plate located on the machine structure, quite visible and easy to consult. ✹

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

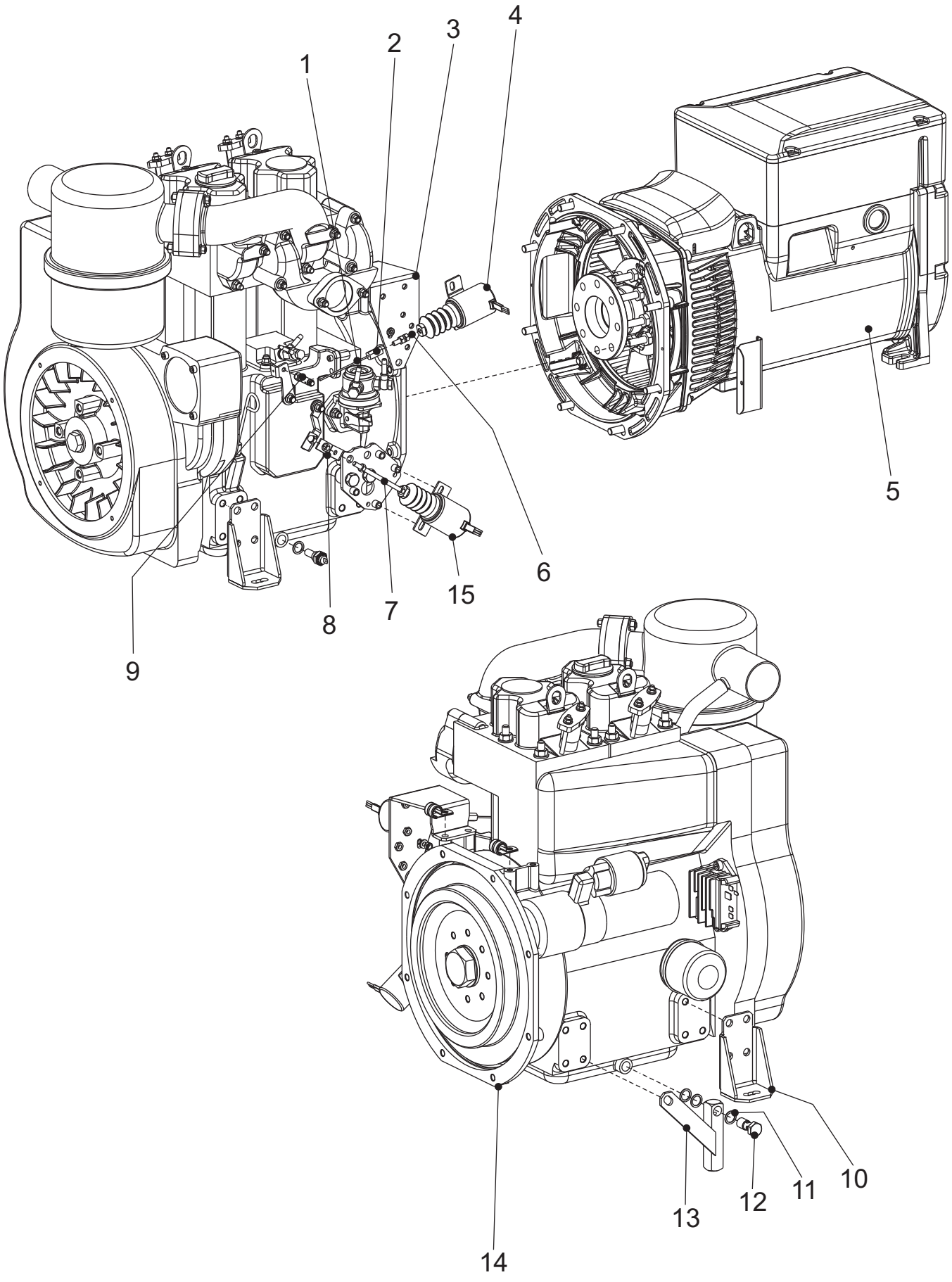






ABBREVIATIONS AND SYMBOLS:

(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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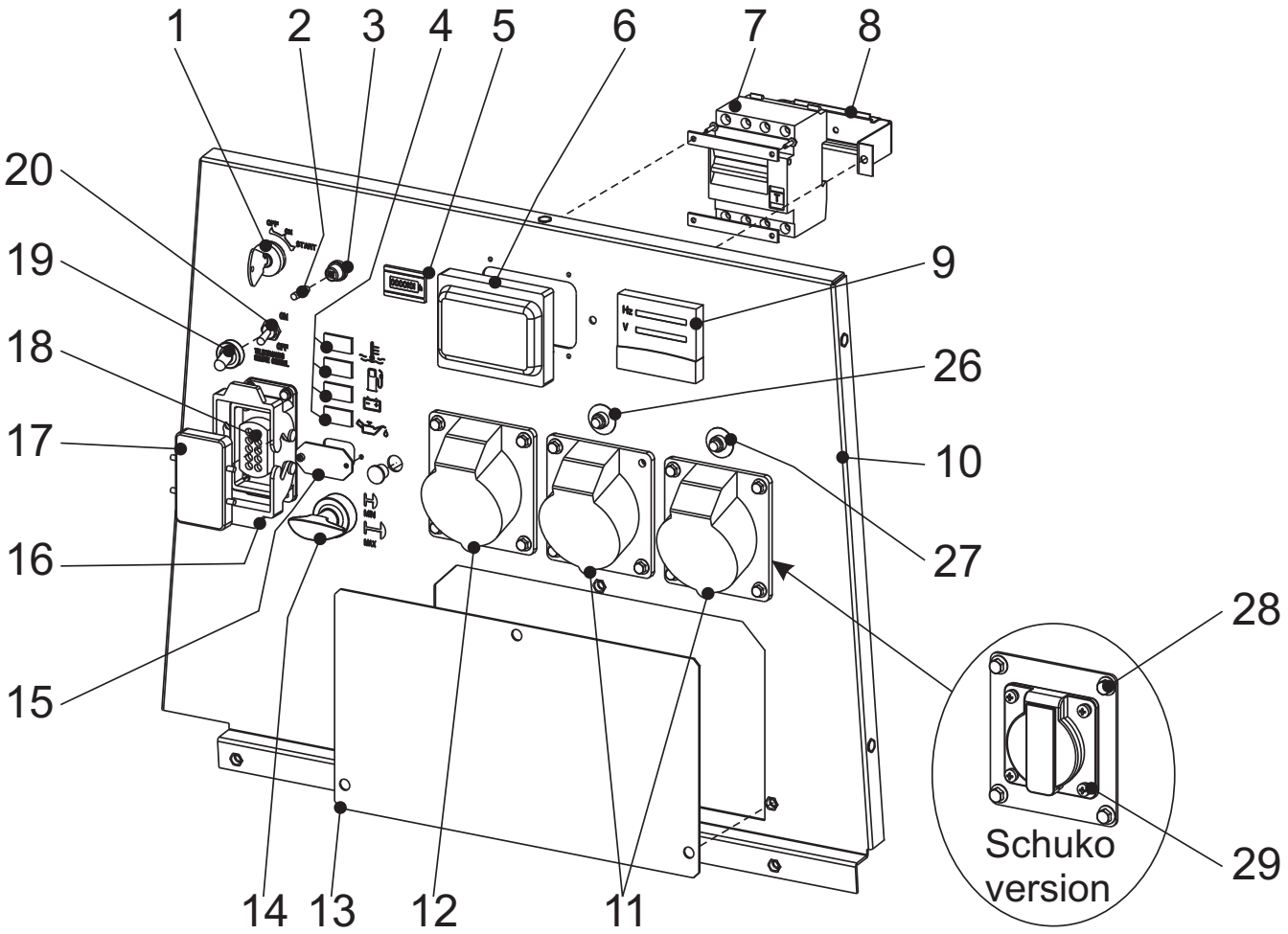
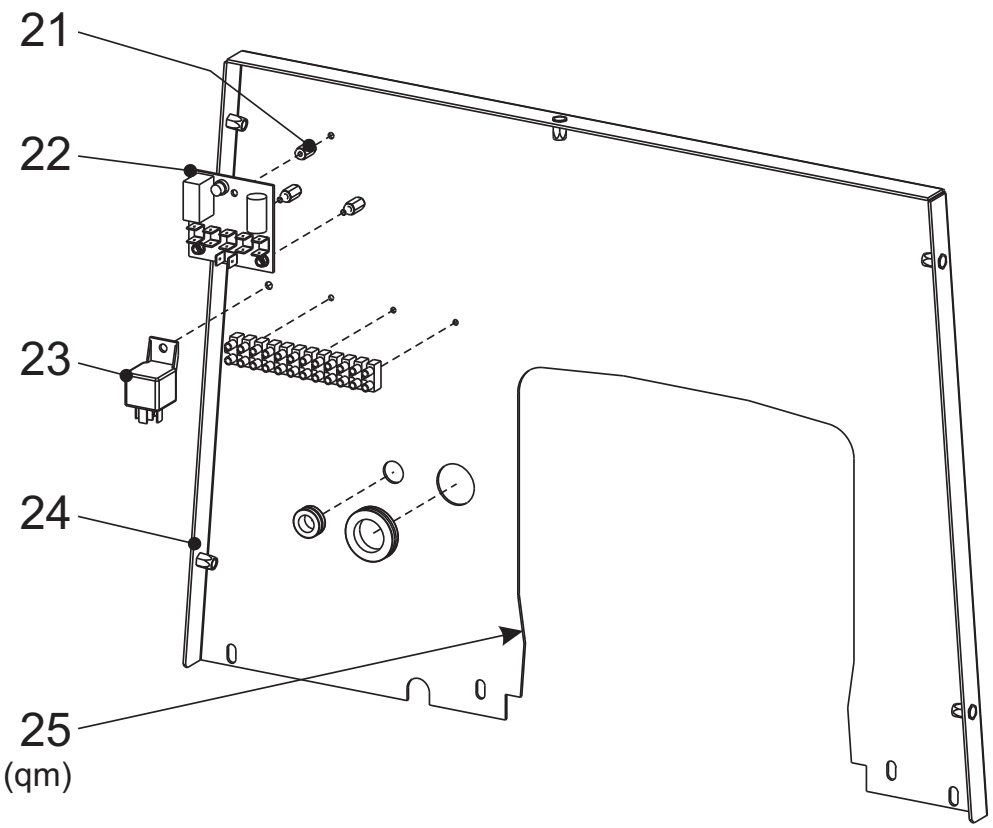
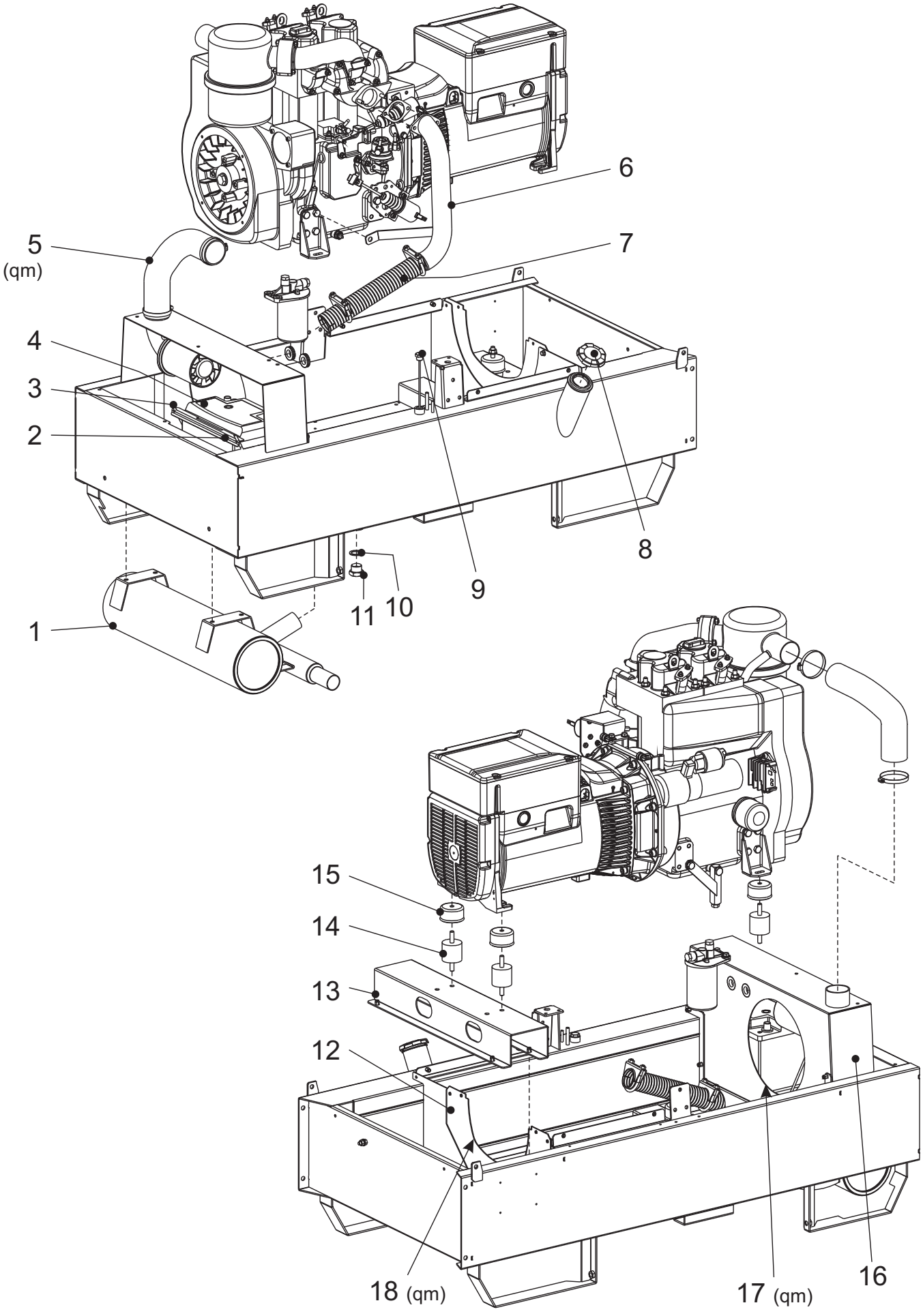
Pos.	Rev.	Cod.	Descr.	Note
1		319869056	FUNE COMANDO ELETTROMAGNETE	
2		107302860	GHIERA	
3		207439101	PIASTRA SUPPORTO	
4		264149050	ELETTROMAGNETE	
5		250203100	ALTERNATORE	
6		305519056	TIRANTE	
7		317609058	TIRANTE COMANDO ELETTROMAGNETE	
8		217609118	SQUAD. GUIDA TIRANTE ELETTROM.	
9		317612244	MORSETTO PER FUNE	
10		207402224	STAFFA	
11		102043880	GUARNIZIONE	
12		207402225	VITE	
13		207602215	PROLUNGA SCARICO OLIO	
14		207612200	MOTORE LOMBARDINI 9LD625-2	
15		274009055	ELETTROMAGNETE	Da REV.1-06/08 -Del.40/08-25/02/08

Pos.	Rev.	Cod.	Descr.	Note
1		319869056	WIRE	
2		107302860	RING NUT	
3		207439101	BRACKET	
4		264149050	SOLENOID	
5		250203100	ALTERNATOR	
6		305519056	TIE ROD	
7		317609058	TIE-ROD	
8		217609118	BRACKET GUIDE SOLENOID TIE ROD	
9		317612244	TERMINAL	
10		207402224	BRACKET FOR ENGINE SUPPORT	
11		102043880	GASKET	
12		207402225	SCREW	
13		207602215	EXTENSION, OIL DRAIN	
14		207612200	LOMBARDINI ENGINE 9LD625-2	
15		274009055	SOLENOID	From REV.1-06/08 -Del.40/08-25/02/08





Pos.	Cod.	Descr.	Note
1	107302460	STARTER A CHIAVE / *STARTER KEY*	
2	1291120	FUSIBILE / *FUSE*	
3	307759045	PORTAFUSIBILE / *FUSE HOLDER*	
4	1302040	SPIA ROSSA 12V / *RED WARNING LIGHT 12V*	Fino a REV.0-09/07 -Del.9/08-16/01/08
4	1302500	SPIA ROSSA 12V / *RED WARNING LIGHT 12V*	Da REV.1-06/08 -Del.9/08-16/01/08
5	105511810	CONTAORE / *HOURMETER 230V 50Hz IP65*	
6	219937130	COPERCHIO INTERRUT.DIFFERENZ. / *COVER GFI*	
7	IC0127106	INT.DIFF./MAGNET. / *THERMAL-MAGNETIC CIRCUIT BREAKER/GFI*	
8	219937036	STAFFA / *BRACKET*	
9	HP0117300	STRUMENTO ANAL.A LED V/Hz 400V50Hz / *ANALOGIC INSTRUMENT V/Hz*	
10	250207020	PANNELLO FRONTALE / *FRONT PANEL*	
11	105111520	PRESA CEE 220V MONOF./ *EEC SOCKET SINGLE-PH.220V 2P+T*	
12	105111510	PRESA CEE 380V TRIFASE / *EEC SOCKET THREE-PHASE 380V*	
13	341518125	COPERCHIO ISPEZ.ALTERNATORE / *COVER ALTERNATOR INSPECTION*	
14	207409105	COMANDO ACCELERATORE / *ACCELERATOR LEVER*	
15	359257032	COPERCH. CHIUS.FORO SCALDIGLIA / *COVER*	
16	105191550	CUSTODIA PER PRESA EAS / *BOX, EAS SOCKET*	
17	105191570	COPERCHIO PER PRESA EAS / *BLIND PLATE, EAS SOCKET*	
18	105191560	FRUTTO PRESA CONNETTORE / *SOCKET, EAS*	
19	102042740	CAPPUCCIO / *CAP*	
20	102013290	COMMUTATORE / *COMMUTATOR*	
21	282009807	DISTANZ. ISOLANTE PER SCHEDE / *SPACER*	
22	209719850	SCHEDA EV/ES / *PCB EV/ES*	
23	306479199	RELE' AVV. ELETTRICO / *RELAY, ELECTRIC START*	
24	250208217	PARATIA SUP. ALTERNATORE / *ALTERNATOR TOP BULKHEAD*	
25	102302280	GUARNIZIONE (L=MT.1) / *GASKET (L=MT.1)*	qm
26	873407107	DISGIUNTORE TERMICO 30A/250V / *CIRCUIT BREAKER 30A/250V*	
27	155307107	DISGIUNTORE TERMICO 15A-250V / *CIRCUIT BREAKER 15A-250V*	
28	214907032	PIASTRINA RIDUZIONE / *REDUCTION FOR SOCKET*	Da REV.1-06/08 -Del,38/08-25/02/08
29	259107241	PRESA SCHUKO / *SOCKET SCHUKO* 16A 230V - 2P+T	Da REV.1-06/08 -Del,38/08-25/02/08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(qm)
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18 (qm)
17 (qm)
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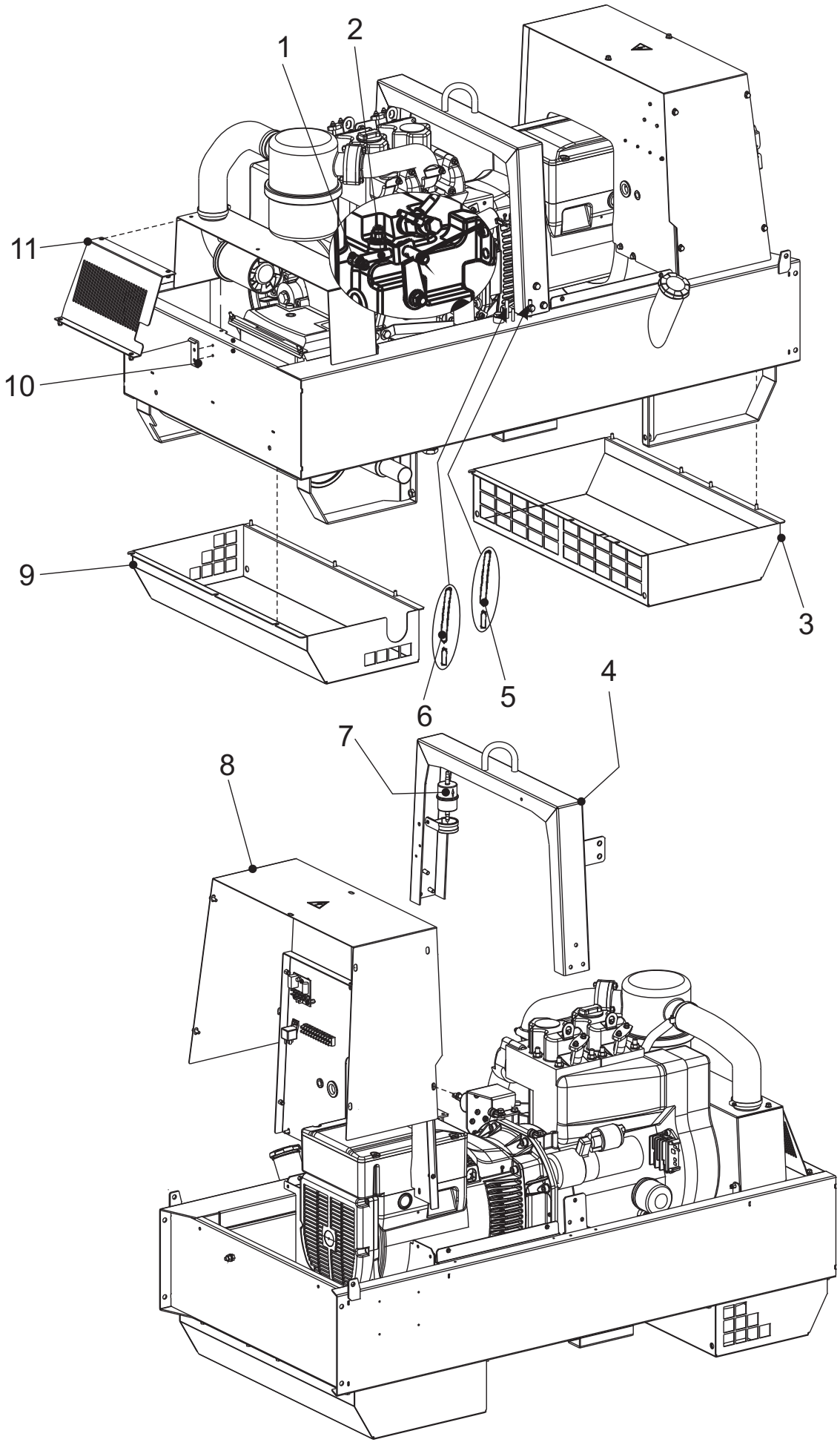
17/09/07 25020-I

Pos.	Rev.	Cod.	Descr.	Note
1		207402050	SILENZIATORE	
2		102041420	TRAVERSA	
3		105611270	TIRANTE PER BATTERIA	
4		773749150	BATTERIA	
5		1229830	TUBO FLESSIBILE (MT.1)	qm
6		207602070	TUBO DI SCARICO	
7		309502077	TUBO FLESSIBILE FINITO	
8		342202026	TAPPO SERBATOIO	
9		305719875	GALLEGGIANTE	
10		308102023	GUARNIZIONE	
11		308101262	TAPPO SCARICO SERBATOIO	
12		250208281	RIDUTTORE PARATIA INF. ALTERNATORE	
13		250201072	TRAVERSA SUPP. ALTERNATORE	
14		105112020	ANTIVIBRANTE	
15		307012037	PROTEZIONE ANTIVIBRANTE	
16		215108200	PARATIA ASPIRAZIONE MOTORE	
17		105112270	GUARNIZIONE (L=MT.1)	qm
18		102302280	GUARNIZIONE (L=MT.1)	qm

Pos.	Rev.	Cod.	Descr.	Note
1		207402050	MUFFLER, EXHAUST	
2		102041420	BRACKET	
3		105611270	TIE ROD, BATTERY	
4		773749150	BATTERY	
5		1229830	FLEXIBLE TUBE (MT.1)	qm
6		207602070	EXHAUST PIPE	
7		309502077	FLEXIBLE PIPE	
8		342202026	CAP, FUEL TANK	
9		305719875	FLOAT	
10		308102023	GASKET	
11		308101262	FUEL TANK CAP	
12		250208281	UNDER COVER REDUCTION	
13		250201072	ALTERNATOR SUPPORT CROSSBAR	
14		105112020	VIBRATION DAMPER	
15		307012037	PROTECTION, VIBRATION-DAMPER	
16		215108200	AIR INTAKE COVER	
17		105112270	STRIP, SEALING (L=MT.1)	qm
18		102302280	GASKET (L=MT.1)	qm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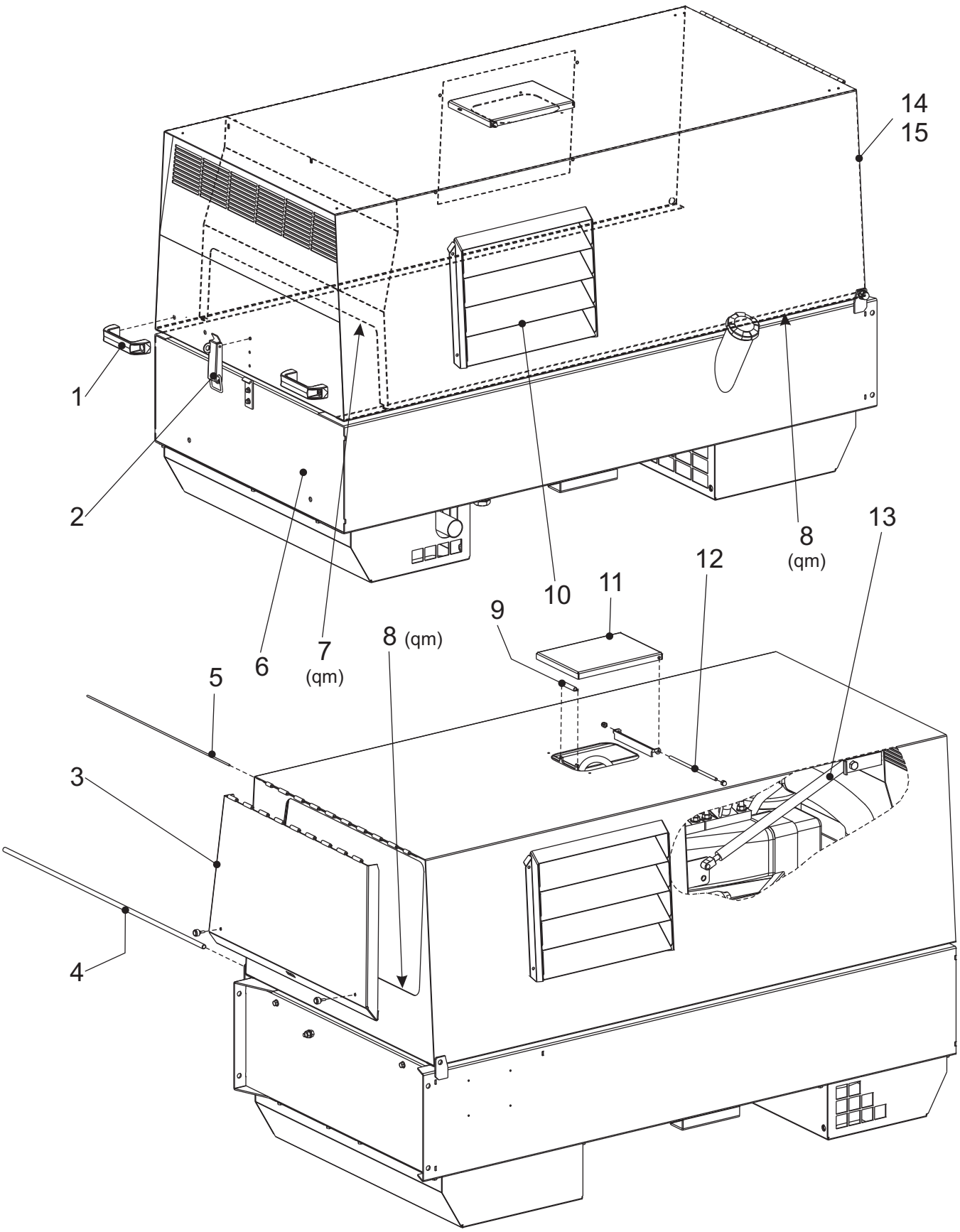
Pos.	Rev.	Cod.	Descr.	Note
1		105111450	MORSETTO	
2		105111460	MOLLA	
3		307410514	CASSONETTO ASPIRAZIONE	Compl. x ricambi
4		207401100	ROLL BAR	
5		107301890	TUBO SFIATO (L=MT.1)	
6		308102207	TUBO GOMMA (L=MT.1)	
7		256602228	FILTRO GASOLIO	
8		207408121	COPERTURA	
9		307410515	CASSONETTO SILENZIATORE (SXC)	Compl. x ricambi
10		107300180	CHIUSURA COMPL.A LEVA	
11		207608230	GRIGLIA	

Pos.	Rev.	Cod.	Descr.	Note
1		105111450	TERMINAL	
2		105111460	SPRING	
3		307410514	INTAKE BOX	Compl. x ricambi
4		207401100	ROLL BAR	
5		107301890	PIPE, BREATHER (L=MT.1)	
6		308102207	PIPE	
7		256602228	FUEL FILTER	
8		207408121	COVER	
9		307410515	EXHAUST BOX (SXC)	Compl. x ricambi
10		107300180	LATCH	
11		207608230	GRATING	


14
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1
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(qm)
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8 (qm)
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(qm)
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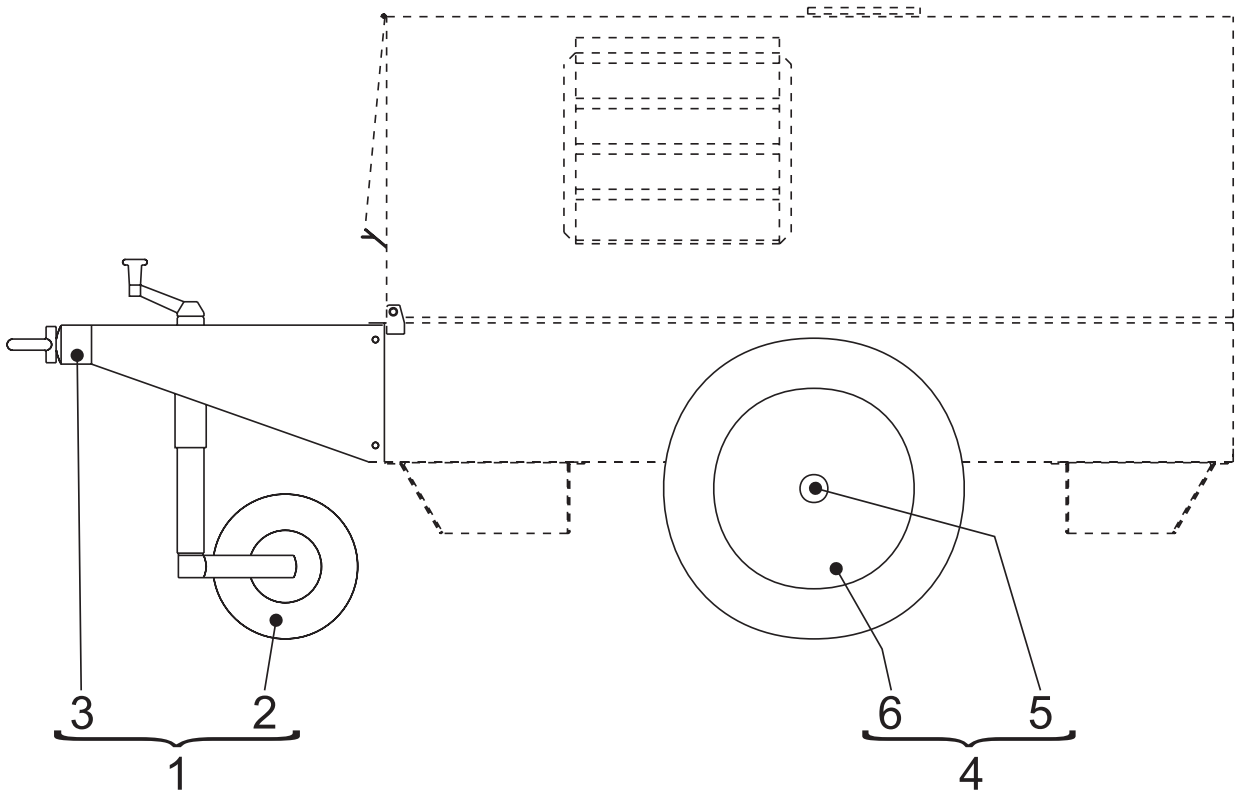
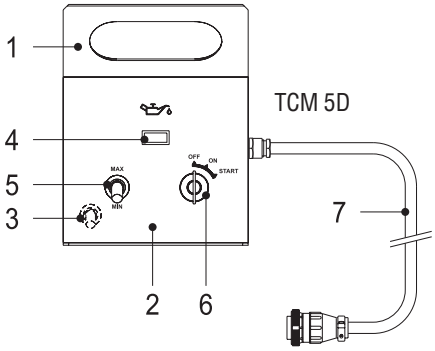
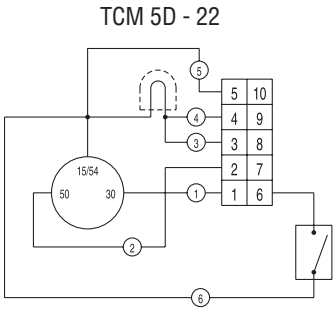
Pos.	Rev.	Cod.	Descr.	Note
1		343339601	MANIGLIA	
2		107300180	CHIUSURA COMPL.A LEVA	
3		207408100	COPERCHIO FRONTALE	
4		207408024	TIRANTE	
5		207608270	PERNO PER CERNIERA	
6		207600501	BASAMENTO COMPLETO	x ricambi
7		102302280	GUARNIZIONE (L=MT.1)	qm
8		105112270	GUARNIZIONE (L=MT.1)	qm
9		102042870	MOLLA	
10		207408065	GRIGLIA	
11		209718070	COPERCHIETTO	
12		209718073	TIRANTE	
13		209508115	PISTONE SOSTEGNO	
14		215108005	CARENATURA COMPL.	
15		250200511	GR.CARENATURA COMPL.RICAMBI	x ricambi

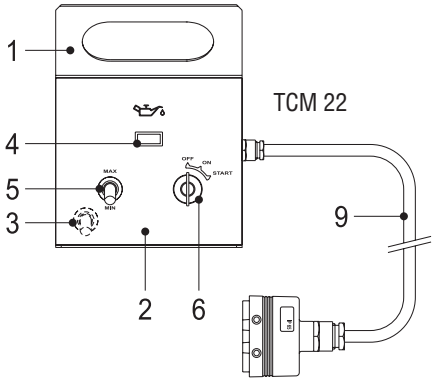
Pos.	Rev.	Cod.	Descr.	Note
1		343339601	KNOB	
2		107300180	LATCH	
3		207408100	FRONT COVER	
4		207408024	TIE-ROD	
5		207608270	HINGE PIN	
6		207600501	BASE (COMPLETE)	x ricambi
7		102302280	GASKET (L=MT.1)	qm
8		105112270	STRIP, SEALING (L=MT.1)	qm
9		102042870	SPRING	
10		207408065	GRATE, AIR OUTLET	
11		209718070	COVER	
12		209718073	TIE-ROD	
13		209508115	SUPPORT, AIR INLET WALL	
14		215108005	COVER COMPL.	
15		250200511	COVER UNIT	x ricambi

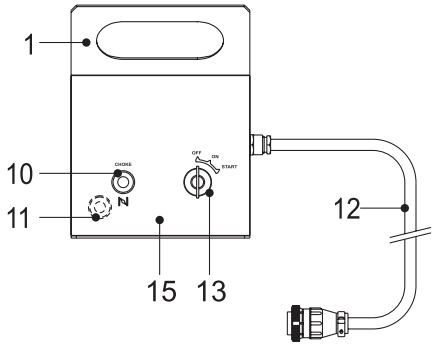


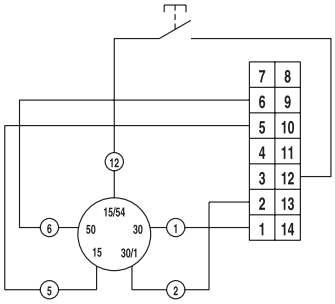
Pos.	Rev.	Cod.	Descr.	Descr.
1		0000217600141	GR.TIMONE,PIEDE X TRAINO LENTO	KIT SITE TOW
2		102351750	PIEDE DI STAZIONAMENTO	PARKING STAND
3		207401150	TIMONE	TOW BAR
4		0000217600142	GR. ASSALE, RUOTE TRAINO LENTO	KIT SITE TOW
5		207401160	ASSALE	AXLE
6		102351740	RUOTA	WHEEL

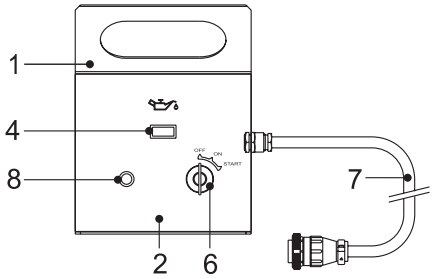


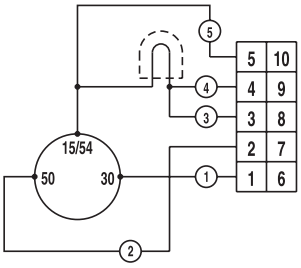




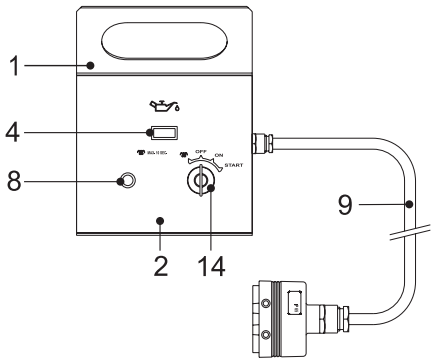


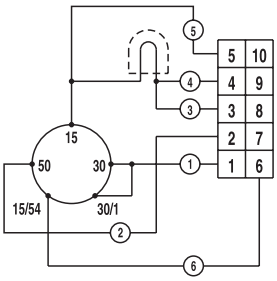






SCHEMA ELETTRICO
ELECTRICAL DIAGRAM
ELECTRIQUE SCHEMA
ELEKTRISCHES SCHEMA
ELECTRISCH GEDEELTE
ESQUEMA ELÉCTRICO





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