



**GE 55 PS**  
**GE 55 PMS**

1 0 1 2

740599003 - GB

## **USE AND MAINTENANCE MANUAL**

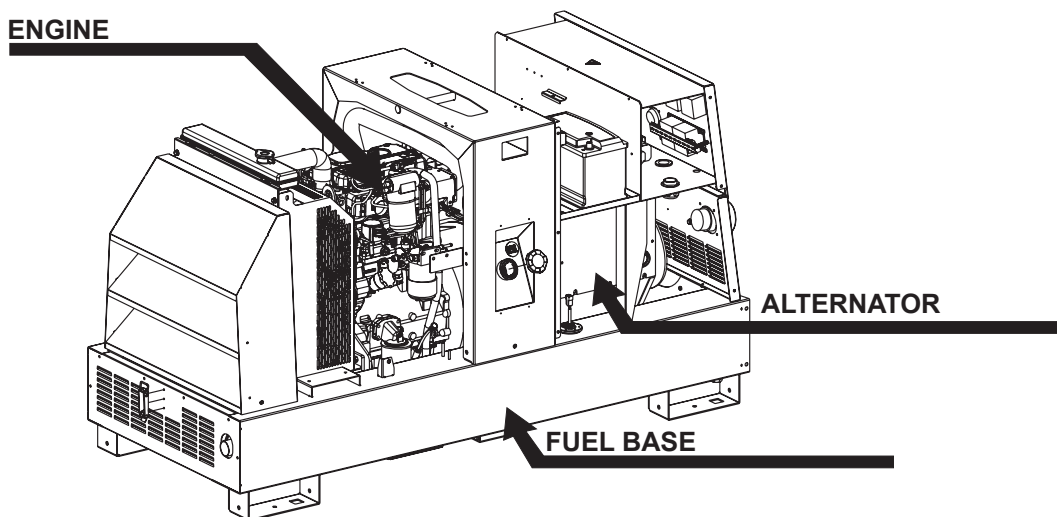
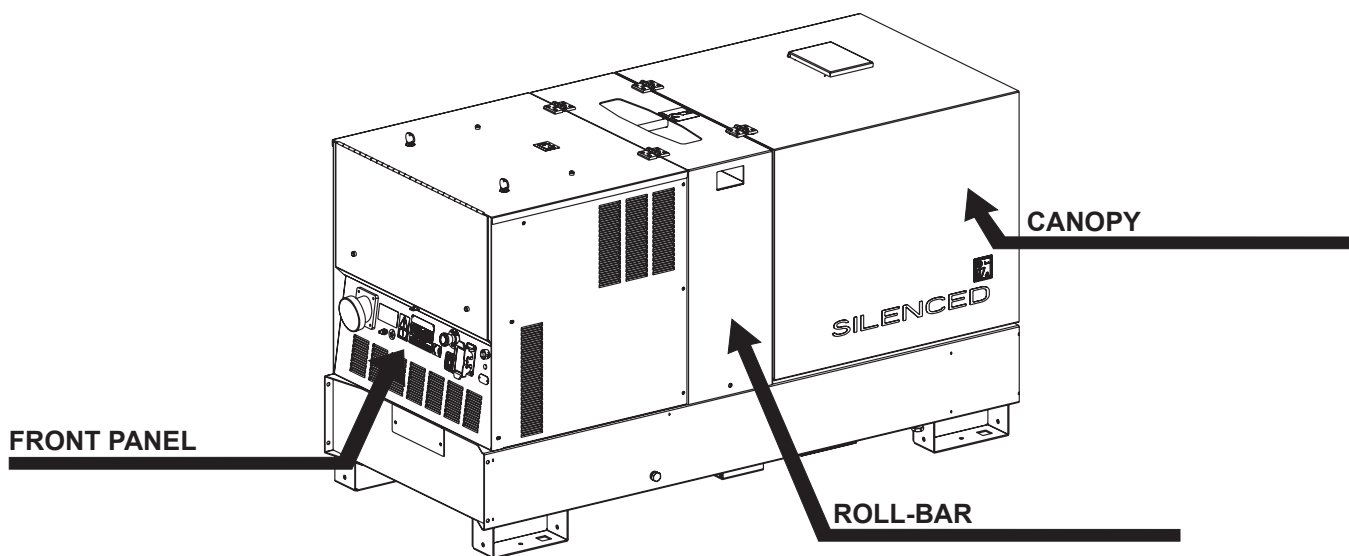




The generating set GE 55 is a unit which transforms the mechanical energy, generated by endothermic engine, into electric energy, through an alternator.

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.





**UNI EN ISO 9001 : 2008**

ISO 9001:2008 - Cert. 0192

MOSA has certified its quality system according to UNI EN ISO 9001:2008 to ensure a constant, high quality of its products. This certification covers the design, production and servicing of engine driven welders and generating sets.

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

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

The advantages for MOSA clients are:

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

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

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M 1.4	CE MARK
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## ATTENTION

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

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

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



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## INFORMATION

Dear Customer,  
We wish to thank you for having bought 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 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.***

## 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 the manufacturer from the risks which could happen or, anyway, from that which was agreed when selling the machine. The manufacturer 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: 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 the manufacturer, 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 applicable 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:

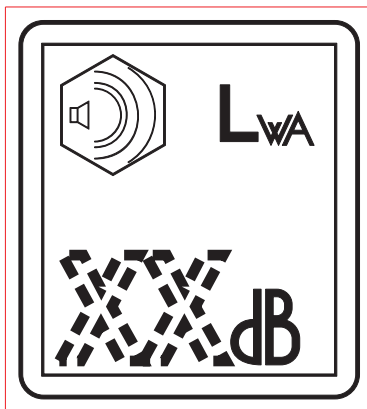


CE marking is clearly readable and unerasable and it can be either part of the data-plate.

Made in UE-ITALY . . . . . TYPE SERIAL N°				
	X			
	I <sub>2</sub> (A)			
U <sub>0</sub>	U <sub>2</sub> (V)			
	I <sub>2</sub> (A)			
	U <sub>0</sub>	U <sub>2</sub> (V)		
Hz	kVA			
P.F.	V (V)			
I (A)				
	n	RPM	n <sub>1</sub>	RPM
	n <sub>0</sub>	RPM	P <sub>max</sub>	KW
				IP
				I. CL.

Made in UE-ITALY . . . . . TYPE Generating Set ISO 8528 SERIAL N°				
KVA				
V				
I				
Hz	P.F.	LTP POWER IN ACCORDANCE WITH ISO 8528		
RPM		I. CL.		IP
ALTIT.	100 m	TEMP.	25 °C	MASS

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.





Technical data

GE 55 PS

GE 55 PMS

GENERATOR

*Stand-by three-phase power	51 kVA (40.8 kW) / 400 V / 73.6 A
**PRP three-phase power	46 kVA (36.8 kW) / 400 V / 66.4 A
**PRP single-phase power	17 kVA / 230 V / 73.9 A
Frequenze	50 Hz
Cos φ	0.8

ALTERNATOR

Self-excited, self-regulated, brushless

Type	synchronous, three-phase
Insulation class	H

MOTOR

Make / Model	Perkins / 1103A - 33TG1
Type / Cooling system	Diesel 4-Stroke / Water
Cylinder / Displacement	3 / 3.3 l (3300 cm³)
Stand-by net power	45.6 kW (62 HP)
PRP net power	41.3 kW (56.2 HP)
Speed	1500 rpm
Fuel consumption (75% of PRP)	8.2 l/h
Engine and filter oil capacity	8.3 l
Starter	Electric

GENERAL SPECIFICATION

Battery	12V - 100 Ah
Fuel tank capacity	65 l
Running time (75% of PRP)	8 h
Protection	IP 23
Dimensions max. on base Lxwxh *	2030x870x1130
Weight on base *	1000 Kg
Guaranteed acoustic power LwA (pressure LpA)	97 dB(A) (72 dB(A) @ 7 m)
Measured acoustic power LwA (pressure LpA)	97 dB(A) (72 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 PRP) = 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 PRP

It's admitted overload of 10% each hour every 12 h.

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

ACOUSTIC POWER LEVEL

ATTENTION: The concrete risk due to the machine depends on the conditions in which it is used. Therefore, it is up to the end-user and under his direct responsibility to make a correct evaluation of the same risk and to adopt specific precautions (for instance, adopting a I.P.D. -Individual Protection Device) Acoustic Noise Level (LWA) - Measure Unit dB(A): it stands for acoustic noise released in a certain delay of time. This is not submitted to the distance of measurement.

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

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

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

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

## SYMBOLS IN THIS MANUAL

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

## IMPORTANT ADVICE

- Advice to the User about the safety:

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

### WARNING



Situations of danger - no harm to persons or things

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

Removing or disabling protective devices on the machine is prohibited.

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

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

## SAFETY PRECAUTIONS



**DANGEROUS**

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



**WARNING**

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



**CAUTION**

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



**IMPORTANT**



**NOTE**



**ATTENTION**

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

**SYMBOLS**



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



Read and pay due attention



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



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



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



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



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



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



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



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



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



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



**ACCES FORBIDDEN** to non authorizad people.

**PROHIBITIONS** No harm for persons

**Use only with safety clothing -**



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

**Use only with safety clothing -**



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

**Use only with safety protections -**



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

**Use with only safety material -**



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

**Use only with non inserted voltage -**



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

**No smoking -**



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

**No welding -**



It is forbidden to weld in rooms containing explosive gases.

**ADVICE** No harm for persons and things

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

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

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



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

**Use only with safety protections -**



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

**Use only with safety protections -**




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

**Use only with safety protections -**



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

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

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






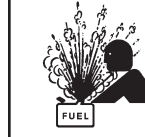




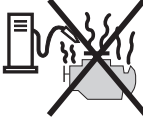


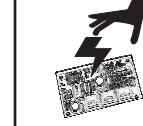



**FIRST AID.** In case the operator should be sprayed by accident, from corrosive liquids a/o hot toxic gas or whatever event which may cause serious injuries or death, predispose the first aid in accordance with the ruling labour accident standards or of local instructions.

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



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

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

WARNING					CAUTION		DANGEROUS
							
							

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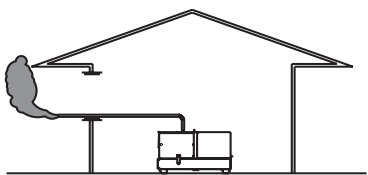
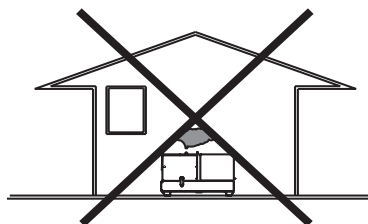
## INSTALLATION AND ADVICE BEFORE USE

### GASOLINE ENGINES

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

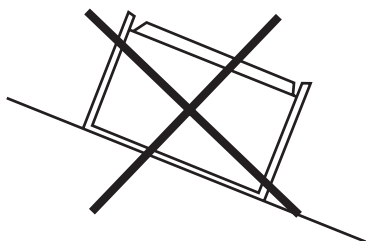
### DIESEL ENGINES

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

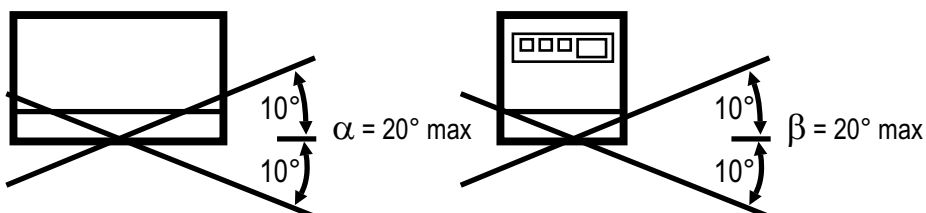


### POSITION

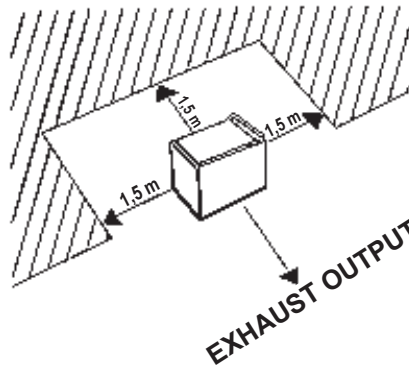
Place the machine on a level surface at a distance of at least 1,5 m from buildings or other plants.



Maximum leaning of the machine (in case of dislevel)



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



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

### MOVES OF THE MACHINE

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

### PLACE OF THE MACHINE

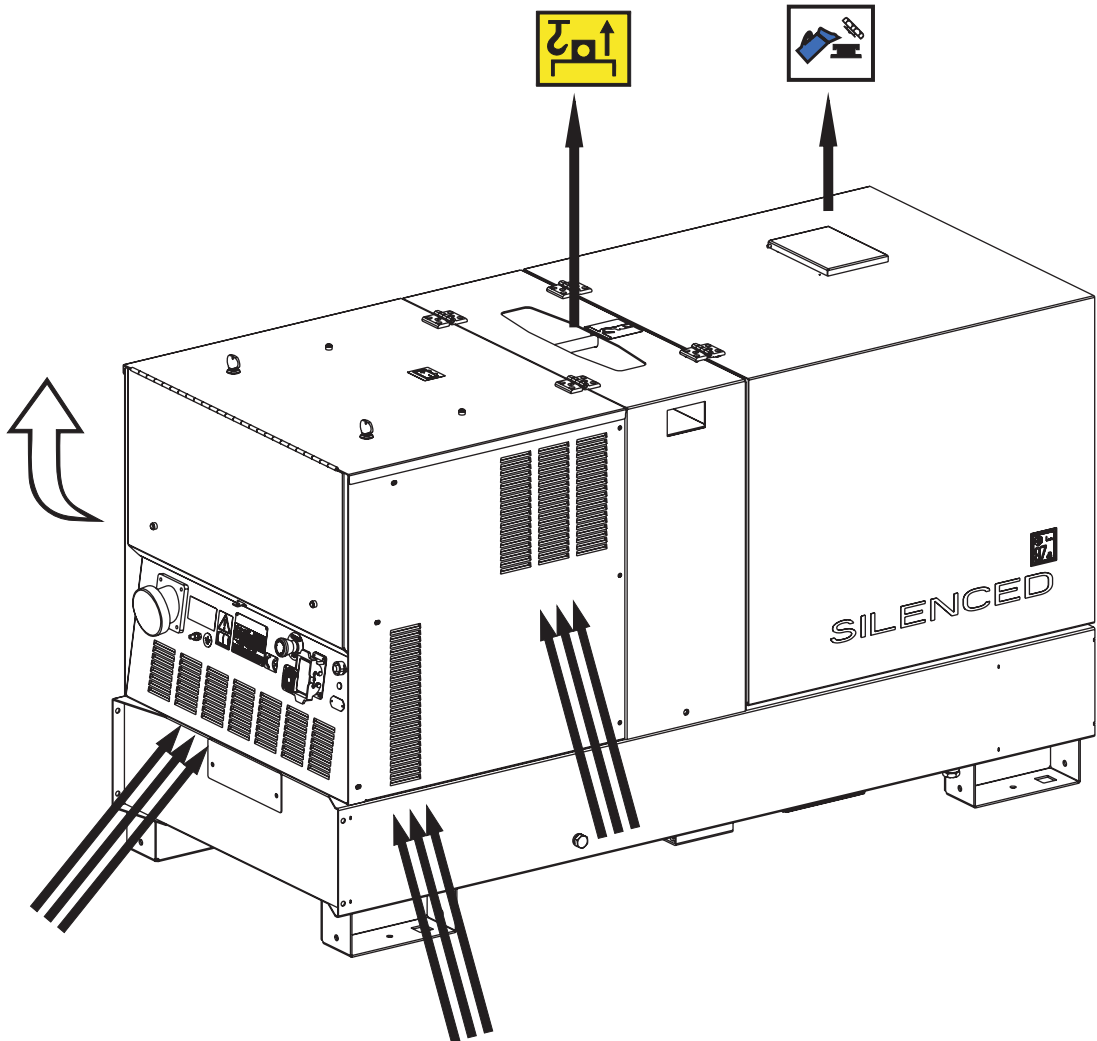
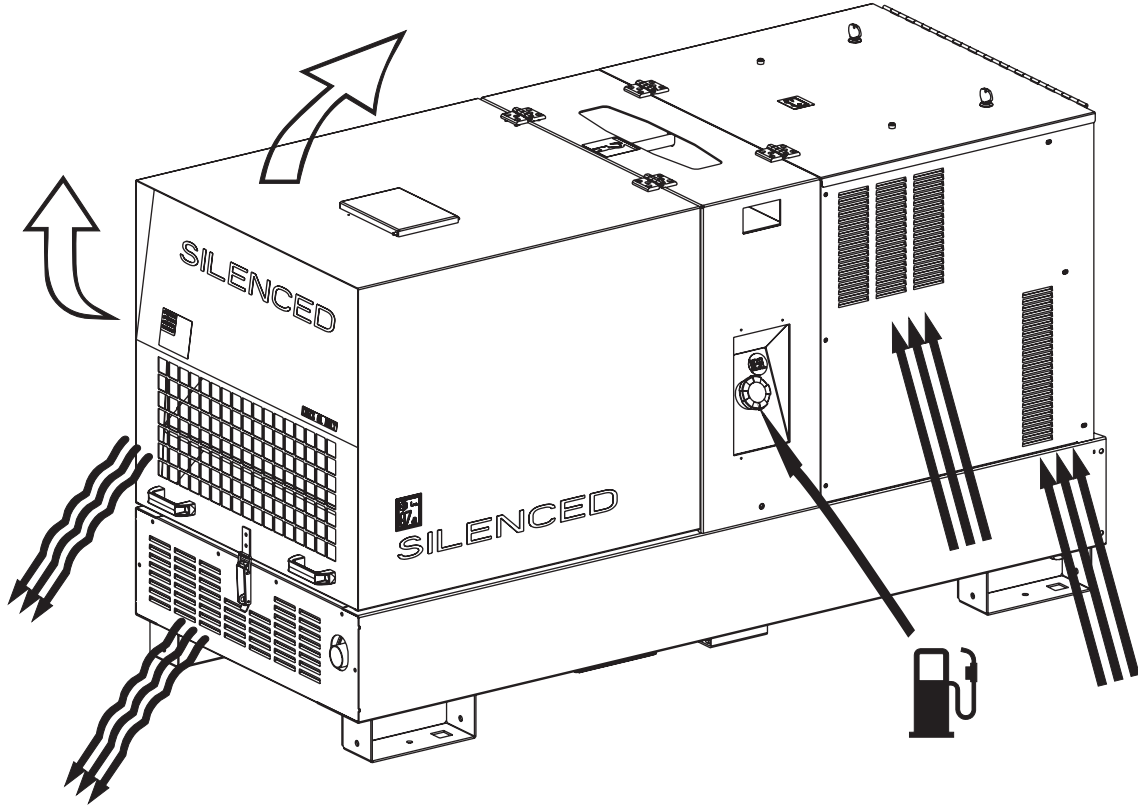


## ATTENTION



For a safer use from the operator **DO NOT** fit the machine in locations with high risk of flood.

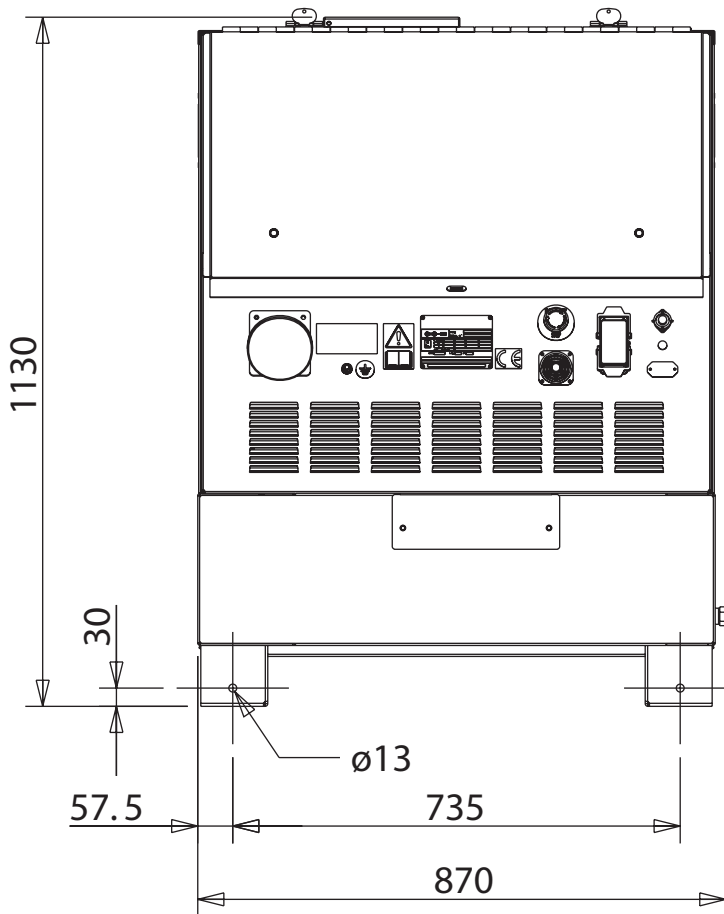
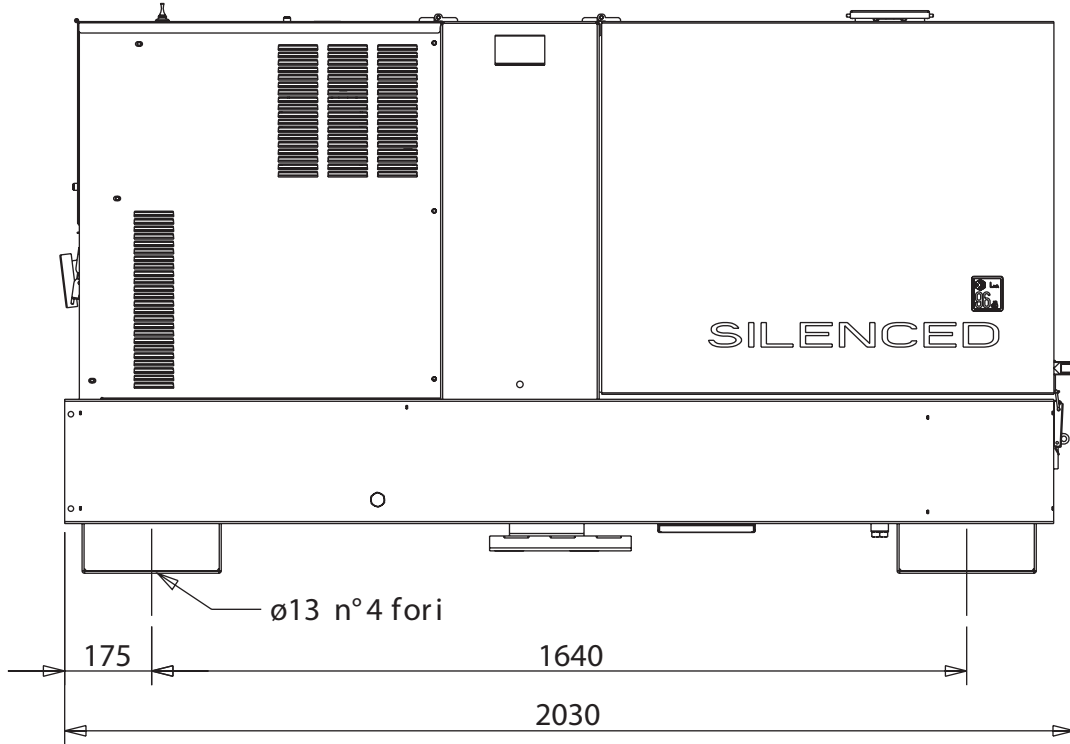
Please do not use the machine in weather conditions which are beyond IP protection shown both in the data plate and on page named "technical data" in this same manual.



- Ⓡ Dimensioni    Ⓛ Abmessungen
- Ⓜ Dimensions    Ⓝ Dimensiones
- Ⓢ Dimensions    Ⓚ

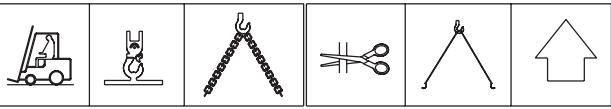
GE 55 PS  
DSP 600 PSX

M  
2.7.1  
REV.0-10/12



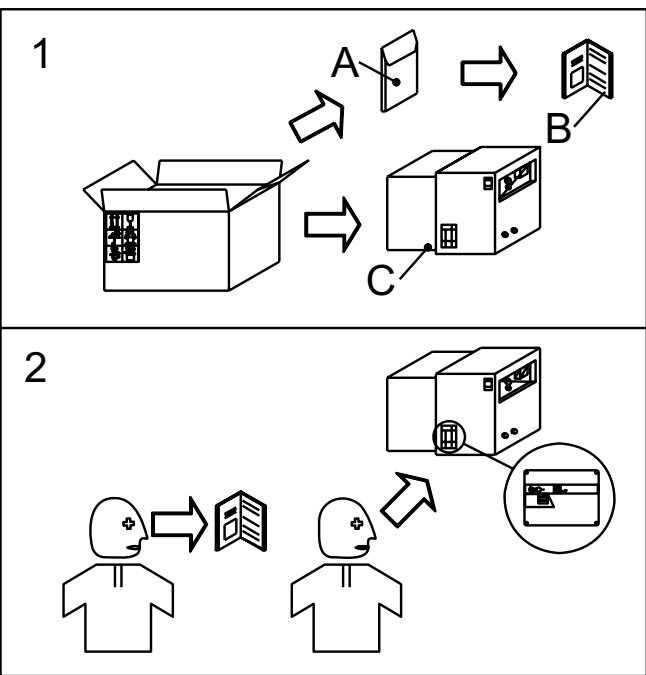
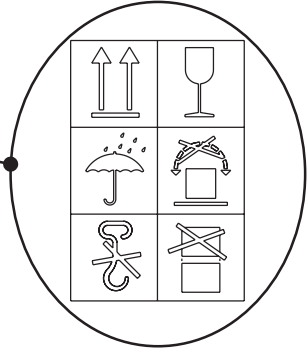
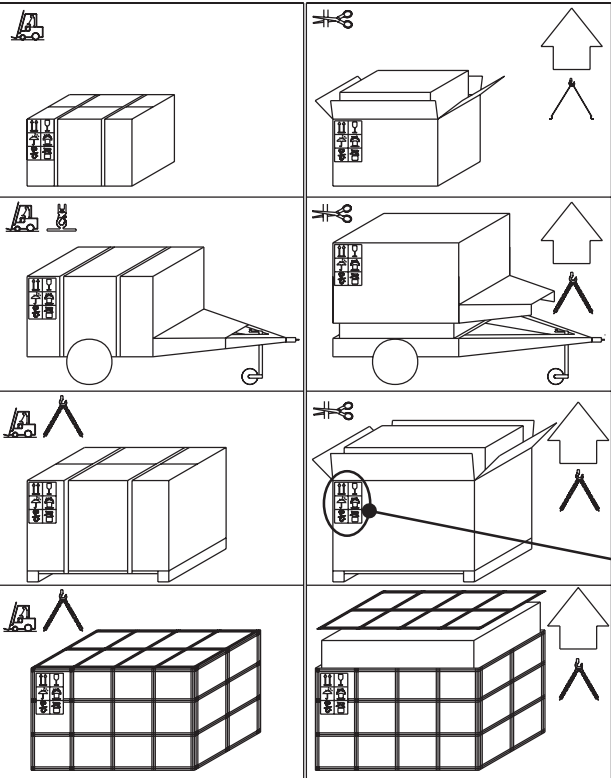


 **NOTE**



Be sure that the lifting devices are: correctly mounted, adequate for the weight of the machine with its packaging, and conforms to local rules and regulations. When receiving the goods make sure that the product has not suffered damage during the transport, that there has not been rough handling or taking away of parts contained inside the packing or in the set. In case you find damages, rough handling or absence of parts (envelopes, manuals, etc.), we advise you to inform immediately our Technical Service.

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



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





**NOTE**

Transportation must always take place with the engine off, electrical cables and starting battery disconnected and fuel tank empty.

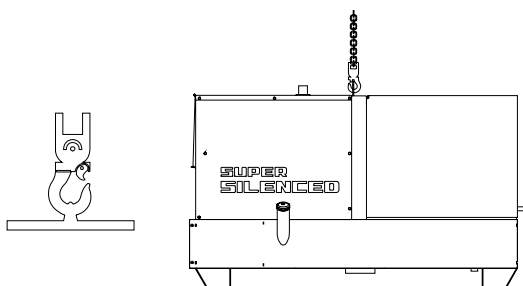
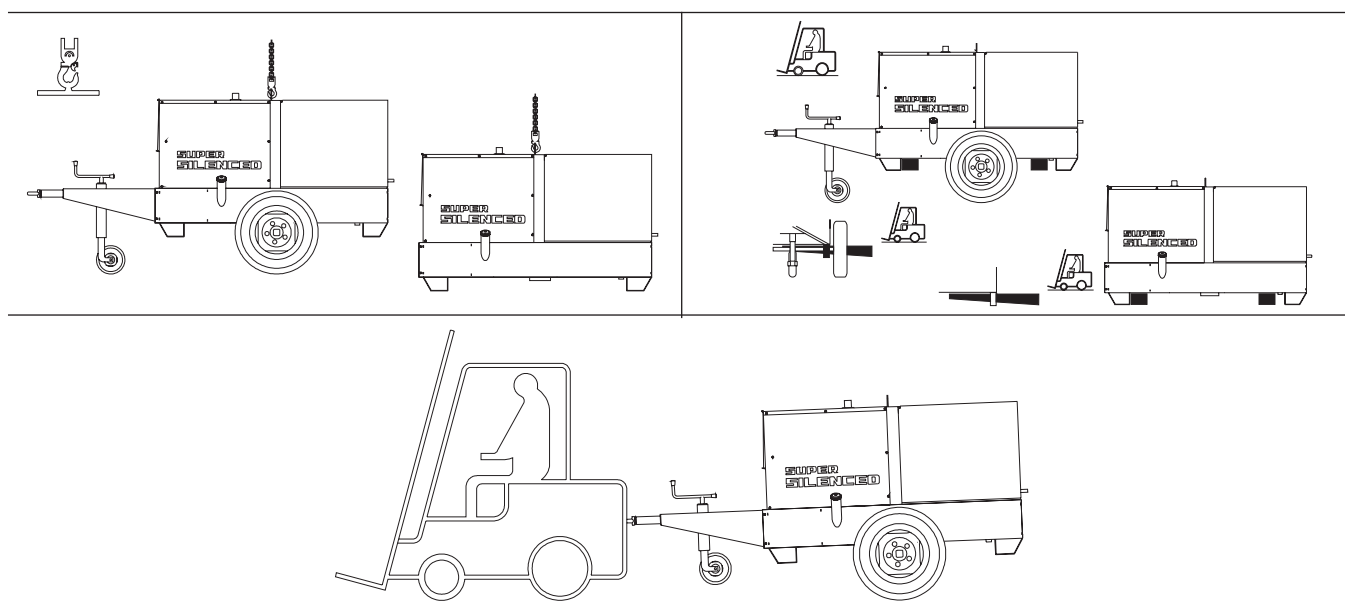
Be sure that the lifting devices are: correctly mounted, adequate for the weight of the machine with it's packaging, and conform to local rules and regulations.

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

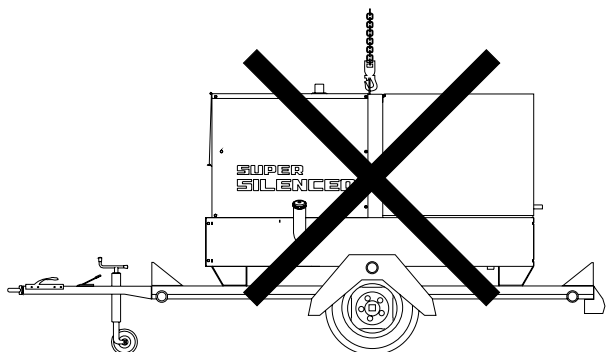
**DO NOT LOAD OTHER PARTS WHICH CAN MODIFY WEIGHT AND BARICENTER POSITION.**

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

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



LIFT ONLY THE MACHINE



DO NOT LIFT THE MACHINE AND TRAILER



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





## ATTENTION

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

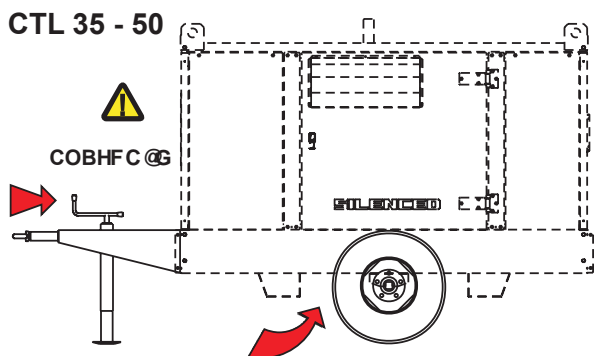
### TRAILERS

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

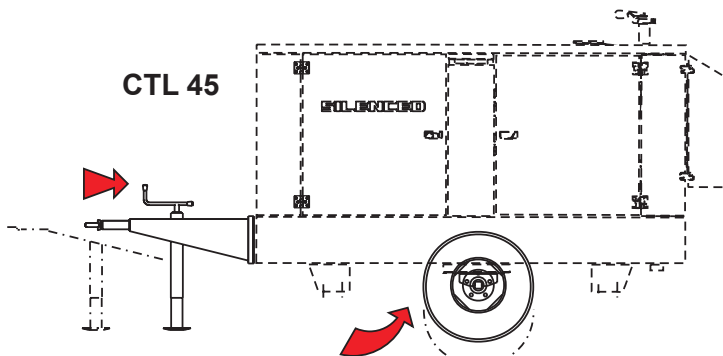
Towing on public roads or turnpikes of any type **IS EXCLUDED**, because **not** in possession of the requirements by national and foreign traffic norms.

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

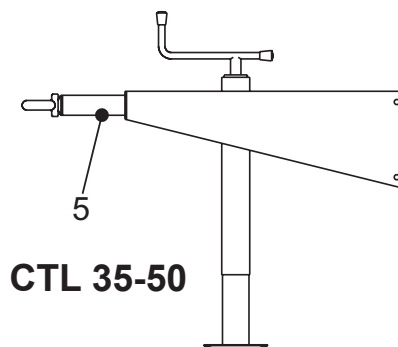
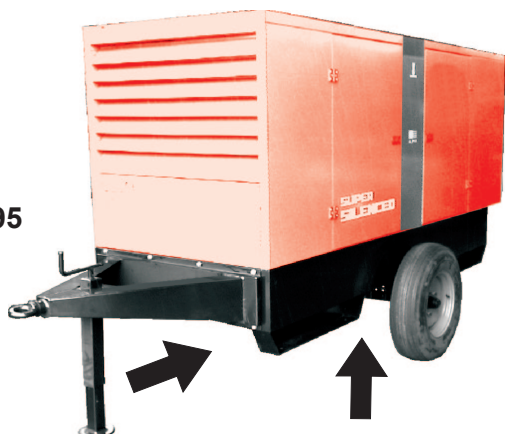
#### CTL 35 - 50



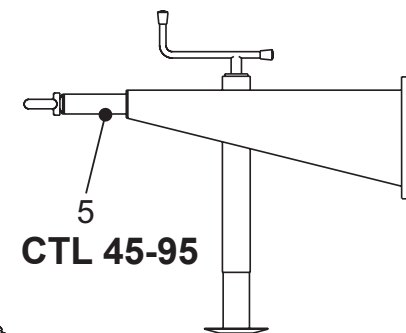
#### CTL 45



#### CTL 95



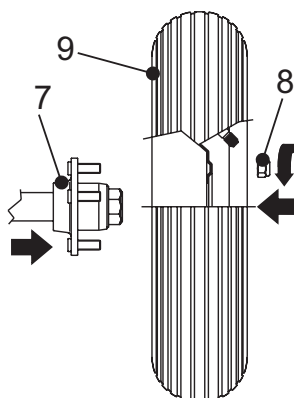
#### CTL 35-50



#### CTL 45-95

For assembling the generating set on the trolley CTL 35-45 -50 - 95 please keep to following instructions:

- 1)- Lift thr generating set (by means of suitable hook)
- 6)- Assemble on the machine the towbar (5) complete offoot with the M10x20 screws,nuts and washers.
- 7)- Assemble the axle (7) to the base of the machine withthe M10x20 screws and relative washers (two perpart) so that their supports coincide.
- 8)- Insert the wheel (9) on the axle then twist theselfblo-cking nut (8).
- 9)- Pump the tyre (9) bringing the pressure to 4 atms forthe CTL 35-45-50 and 5/6 for the CTL 95.
- 10)- Lower the machine to the ground and place the par-kingfoot definitively (regulating at the best height).



### ATTENTION

Do not substitute the original tyres with other types.



I

GB

Set-up for operation

F

Water cooled systems

M

20

REV.1-09/05



### BATTERY WITHOUT MAINTENANCE



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

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

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

**DO NOT OPEN THE BATTERY.**



### LUBRICANT

#### RECOMMENDED OIL

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

 PRODOTTI RACCOMANDATI RECOMMENDED PRODUCTS	
<b>AGIP</b> SIGMA TURBO PLUS 15W/40 API CG4 - ACEA E3	OLIO MOTORE DIESEL DIESEL ENGINE OIL
<b>AGIP</b> SUPERMOTOROIL 20W/50 API CC-SF	OLIO MOTORE BENZINA GASOLINE ENGINE OIL
<b>AGIP</b> ANTIFREEZE EXTRA INIBITE ETHYLENE GLYCOL (50% + 50% + H <sub>2</sub> O)	CIRCUITO DI RAFFREDDAMENTO COOLING CIRCUIT (CUNA NC 956-16 ED 97)

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

#### REFUELLING AND CONTROL:

Carry out refuelling and controls with motor at level position.

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



### 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.



### 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.



### ATTENTION

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





**COOLING LIQUID**



**ATTENTION**



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

Remove the tap and pour the liquid coolant into the radiator; the quantity and composition of the liquid coolant are indicated in the motor operating manual. Replace the tap, ensuring it is perfectly closed. After refilling operations, allow the motor to run for a brief time and check the level, as it may have diminished due to air bubbles present in the cooling circuit; restore the level with water. To replace the liquid coolant, follow the operations described in the motor operating manual.

**ATTENTION:**

The engine cooling system is originally filled with coolant type:

**AGIP ANTIFREEZE EXTRA**

During the engine life it is strongly recommended to use the same coolant type. This is because a coolant change would require a careful cleaning of the cooling system, which is not an easy job. A lack in tacking these precautions would result in the mix of different additives used in different coolants which would originate gelatinous substances capable of obstructing the cooling system.



**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.

 <b>PRODOTTI RACCOMANDATI</b> <b>RECOMMENDED PRODUCTS</b>	
<b>AGIP SIGMA TURBO PLUS 15W/40</b> API CG4 - ACEA E3	OLIO MOTORE DIESEL DIESEL ENGINE OIL
<b>AGIP SUPERMOTOROIL 20W/50</b> API CC-SF	OLIO MOTORE BENZINA GASOLINE ENGINE OIL
<b>AGIP ANTIFREEZE EXTRA</b> INIBITE ETHYLENE GLYCOL (50% + 50% + H <sub>2</sub> O)	CIRCUITO DI RAFFREDDAMENTO COOLING CIRCUIT (CUNA NC 956-16 ED 97)





Check daily



**NOTE**

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

The starting of the unit can be effected in 3 different modes:

**1) Start with EP6 key (Engine Control)**

Put the “Local/Remote” selector on Local. Turn the key on “ON”, the EP6 display shows, only on the machines with mounted glow plugs for 5 secs, the symbol “UUUU”, then the message “Sta” appears the engine can be started, for then turn the key on “start” and start the engine.

On the display the word “Sta” remains for about 20 sec then automatically disappears; the engine **must be** started within 20 secs, otherwise the EP6 blocks the starting and on the display the word “fail” appears. Turning the key on “OFF” the EP6 is reset and a new starting cycle can be fixed.

**Stop:**

it is COMPULSORY to disconnect the load first, then to stop the engine turn the key on “OFF”.

**2) Remote starting with TCM35**

Put the “Local/Remote” selector on Local. Connect TCM35 to the plug on the front panel and put the switch on “0”.

Turn the key on ON in the EP6, wait for the various signals to go out then press the button “AUTO” in the EP6 until the led “AUTO” flashes.

Shift the switch on “1” in the TCM35 and automatically the starting cycle will start. On the machines with mounted glow plugs appears in the display EP6 (for about 5 secs), the symbol “UUUU”; the starting cycle includes 3 starting trials.

When the engine starts the led “AUTO” remains lit continuously and simultaneously the red warning light will light in the TCM35.

**Stop:**

it is COMPULSORY to disconnect the load first, then shift the switch of the TCM35 on “0”, the engine will stop immediately.

**3) Start with Automatic start unit (EAS)**

Put the “Local/Remote” selector on Remote. Connect the EAS to unit.

The EAS controls the starting as well as the stop of the engine.

Follow attentively the instructions reported in the EAS manual. In these conditions the EP6 has the only function to measure the electric values, hour-meter, etc.



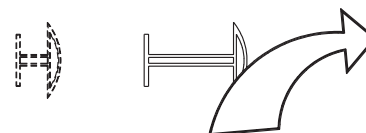
**CAUTION**

**MACHINE WITH EMERGENCY BUTTON**

Pressing the button the engine will stop immediately in any working condition.



Turn clockwise to reset the button.



**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.*

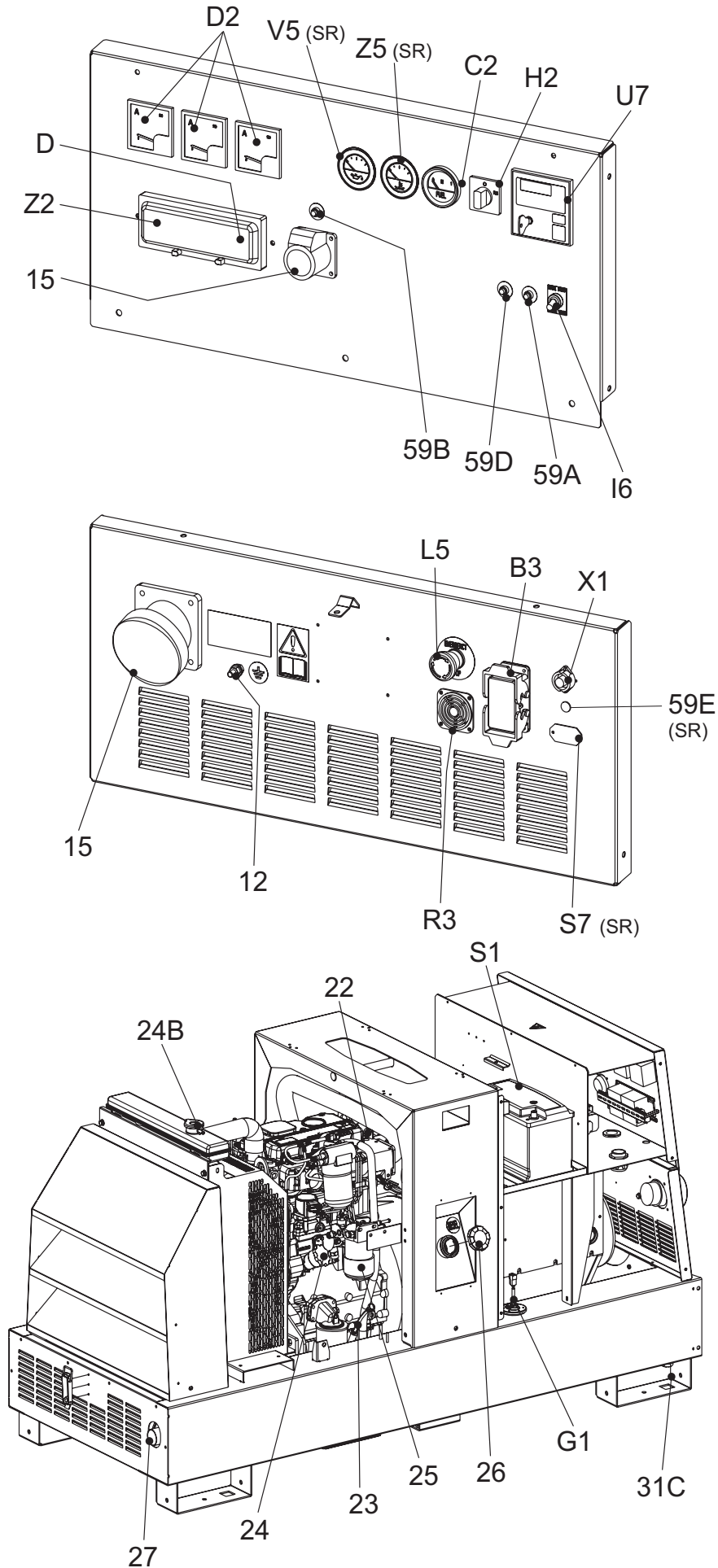


**NOTE**

For safety reason the key must be kept by qualified personel.

4A	Hydraulic oil level light	B4	Exclusion indicating light PTO HI	W5	Battery voltmeter
9	Welding socket ( + )	B5	Auxiliary current push button	X1	Remote control socket
10	Welding socket ( - )	C2	Fuel level light	Y3	Button indicating light 20 l/1' PTO HI
12	Earth terminal	C3	E.A.S. PCB	Y5	Commutator/switch, serial/parallel
15	A.C. socket	C6	Control unit for generating sets QEA	Z2	Thermal-magnetic circuit breaker
16	Accelerator lever	D	Ground fault interrupter ( 30 mA )	Z3	Selection push button 20 l/1' PTO HI
17	Feed pump	D1	Engine control unit and economiser EP1	Z5	Water temperature indicator
19	48V D.C. socket	D2	Ammeter		
22	Engine air filter	E2	Frequency meter		
23	Oil level dipstick	E6	Frequency rpm regulator		
24	Engine oil reservoir cap	E7	Voltmeter regulator		
24A	Hydraulic oil reservoir cap	F	Fuse		
24B	Water filling cap	F3	Stop switch		
25	Fuel prefilter	F5	Warning light, high temperature		
26	Fuel tank cap	F6	Arc-Force selector		
27	Muffler	G1	Fuel level transmitter		
28	Stop control	H2	Voltage commutator		
29	Engine protection cover	H6	Fuel electro pump		
30	Engine cooling/alternator fan belt	H8	Engine control unit EP7		
31	Oil drain tap	I2	48V A.C. socket		
31A	Hydraulic oil drain tap	I3	Welding scale switch		
31B	Water drain tap	I4	Preheating indicator		
31C	Exhaust tap for tank fuel	I5	Y/▲ switch		
32	Button	I6	Start Local/Remote selector		
33	Start button	I8	AUTOIDLE switch		
34	Booster socket 12V	L	A.C. output indicator		
34A	Booster socket 24V	L5	Emergency button		
35	Battery charge fuse	L6	Choke button		
36	Space for remote control	M	Hour counter		
37	Remote control	M1	Warning level light		
42	Space for E.A.S.	M2	Contactora		
42A	Space for PAC	M5	Engine control unit EP5		
47	Fuel pump	M6	CC/CV switch		
49	Electric start socket	N	Voltmeter		
54	Reset button PTO HI	N1	Battery charge warning light		
55	Quick coupling m. PTO HI	N2	Thermal-magnetic circuit breaker/ Ground fault interrupter		
55A	Quick coupling f. PTO HI	N5	Pre-heat push-button		
56	Hydraulic oil filter	N6	Connector - wire feeder		
59	Battery charger thermal switch	O1	Oil pressure warning light/Oil alert		
59A	Engine thermal switch	P	Welding arc regulator		
59B	Aux current thermal switch	P8	Water in fuel		
59C	Supply thermal switch wire feeder-42V	Q1	Starter key		
59D	Pre-heater (spark plug) thermal switch	Q3	Derivation box		
59E	Supply thermal switch oil/water heater	Q4	Battery charge sockets		
59F	Electropump thermal switch	Q7	Welding selector mode		
63	No load voltage control	R3	Siren		
66	Choke control	S	Welding ammeter		
67A	Auxiliary / welding current control	S1	Battery		
68	Cellulosic electrodes control	S3	Engine control unit EP4		
69A	Voltmeter relay	S6	Wire feeder supply switch		
70	Warning lights	S7	Plug 230V singlephase		
71	Selecting knob	T	Welding current regulator		
72	Load commut. push button	T4	Dirty air filter warning light/indicator		
73	Starting push button	T5	Earth leakage relay		
74	Operating mode selector	T7	Analogic instrument V/Hz		
75	Power on warning light	U	Current transformer		
76	Display	U3	R.P.M. adjuster		
79	Wire connection unit	U4	Polarity inverter remote control		
86	Selector	U5	Release coil		
86A	Setting confirmation	U7	Engine control unit EP6		
87	Fuel valve	V	Welding voltage voltmeter		
88	Oil syringe	V4	Polarity inverter control		
A3	Insulation monitoring	V5	Oil pressure indicator		
A4	Button indicating light 30 l/1' PTO HI	W1	Remote control switch		
B2	Engine control unit EP2	W3	Selection push button 30 l/1' PTO HI		
B3	E.A.S. connector				







**CONTROLS**

**GE 55 PS - PMS**

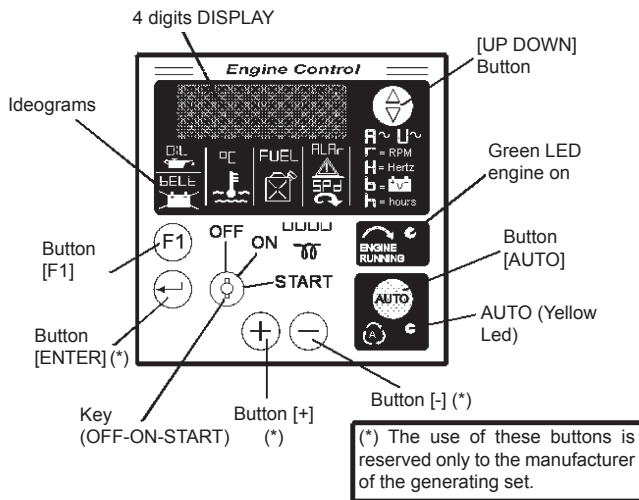
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32**

REV.0-10/12

Z2	Thermal-magnetic circuit breaker	General switch for the gen-set. It protects both gen-set and related electrical circuit from over current /short circuit.
D	Ground fault interrupter (30 mA)	Device for protection against not-direct contacts for TN and TT systems (neutral grounded to frame)
D2	N° 3 ammeters	Monitoring of the line currents.
V5 (SR)	Oil pressure indicator	Indicates engine oil pressure (bar).
Z5 (SR)	Water temperature indicator	Indicates cooling liquid temperature (C).
C2	Fuel level gauge	Indicates fuel in the reservoir (%).
H2	Voltage commutator	Selection of visualized line voltage.
U7	Engine control unit EP6	Engine control unit. Genset stop/ start. Handling of generator alarms. display of alarms, Voltage, Hz, hour counter, Amps, battery voltage, operation messages.
15	A.C. socket	AUX sockets for load connection.
59D	Thermal switch for pre-heating plugs	Protects against over-current and short circuit in pre-heating plugs
59A	Engine thermal switch	Protection against over-currents and short circuits in the engine electrical system.
59B	AUX thermal circuit breaker	Overcurrent protection of the equipments connected to the single-phase sockets
I6	Start Local/Remote selector	Selection of engine control in use. Local start: control on board, EP6 operated. Remote start: external control, EAS operated.
12	Earth terminal	Ground connection point for gen-set.
X1	Remote control socket	Connection for TCM35 remote control or for a NO clean contact, both operating only if EP6 is set to AUTO.
B3	E.A.S. connector	Connection for automatic intervention unit (AMF + ATS). 10 pin connector.
L5	Emergency button	To be pushed in case of danger. Immediate stop of the gen-set.
R3	Siren	Gen-set acoustic alarm.
S7 (SR)	Plug 230V single-phase	External supply for engine heater (mains).



FRONT PANEL



1.0 INTRODUCTION

The EP6 features Engine and Generating Set control and monitoring. The EP6 provides visual indication by means of LEDs (solid state lamps) and a Display (see section 10.0). It features OFF, MAN and AUTO operating modes. The display gives Messages for alarms and Measurement indications.

**EP6 has programmable parameters. Please contact the producer of the generating set to receive instructions related to programming.**

2.0 OPERATING MODE selection

The EP6 features AUTO (section 2.1), MANUAL (section 2.2) and OFF (section 2.3) operating modes. When the power supply is switched on, the EP6 behaves as follow:

- A) if the KEY-SWITCH is in the **OFF position**, the EP6 enters the OFF operating mode.
- B) if the KEY-SWITCH is in the **ON position**, the EP6 enters the AUTO operating mode. That is, if the EP6 was in AUTO prior to the supply removal. If not, the EP6 enters the MANUAL operating mode.

2.1 AUTO operating mode

To enter the "AUTO" operating mode use the following instructions:

- A) - Turn ON the key switch: the Display and LEDs illuminate for 1 second.
- B) - Wait for the end of the LAMP test, then push the AUTO pushbutton after the [UUUU] (Pre-glow) or [Sta-] (Start prompt) has been displayed. After this, the yellow Led AUTO will illuminate. If the REMOTE START input is not operative, the LED will flash. If operative, the LED illuminates continuously and a start cycle will take place (**NOTE**: the EP6 shuts down the display during the crank).

- C) - In order to cancel the AUTO operating mode, push the AUTO pushbutton (the yellow Led will turn OFF) or turn the KEY-SWITCH to OFF. Once in AUTO, the EP6 waits for a REMOTE START activation (see section 7.0). In case of an Automatic Periodic Test (A.P.T.), the display will show the message [tEst].

2.2 MANUAL operating mode

To start the engine follow the instructions:

- A) - Turn ON the KEY-SWITCH; the EP6 illuminates the LEDs and Display.
- B) - If the display shows the message [uuuu], the EP6 is counting the PRE-GLOW time; wait until the message disappears.
- C) - After the display shows the flashing message [StA-] (**NOTE**), turn the Key to START position (momentary position with spring-loaded return) until the engine starts. The message [ . . . ] indicates a MANUAL start.
- D) - To stop the engine, turn the KEY SWITCH to OFF.

**NOTE: EP6 shows the blinking [StA-] message for 20 seconds. After this time, if the engine does not start, the EP6 displays the message [FAIL] (Fail to start, see section 4.07). To clear the alarm, turn the KEY-SWITCH to OFF.**

2.3 OFF operating mode

This function is obtained by turning the KEY SWITCH to OFF. The OFF operating mode clears the fault alarms and shuts down the Display after 5 seconds. A blinking dot indicates the presence of the power supply. Press one of the pushbuttons to energize the display. In OFF operating mode, the EP6 allows reading of the parameters (see section 6.0).

3.0 DISPLAY features

The EP6 features a 4 Digit Display (section 10.0) to show measurements, settings and error messages. The [UP-DOWN] pushbutton selects one of the following menus:

- [AXXX] (\*) Generator Current measurement
- [UXXX] The Voltage of the Generating Set
- [rPM] [XXXX] Speed of the engine
- [HXX.X] Frequency of the Generator
- [bXX.X] Battery Voltage
- [cXX.X] Charger Alternator Voltage
- [ h ] [XXXX] HOUR METER (the message [h] appears for a moment, and then, the counter will be displayed continuously).

(\*): the symbol "X" means a numerical field.

#### 4.0 ALARM messages

The alarms are displayed by means of messages. In case of alarm consult your Generating Set manufacturer. To remove the message, turn OFF the KEY-SWITCH. The EP6 may show one of the following:

[OIL]	Low Oil Pressure
[ °C ]	High Temperature
[O.SPd.]	Over Speed of the engine
[U.SPd]	Under Speed of the engine
[bELt]	Failure of the belt
[ALAR]	External Emergency Stop
[FUEL](1)	Low Fuel in the tank
[FAIL]	Starting Failure Alarm
[E 04]	Alternator Failure
[E 05](2)	Generator Overload
[Hi H](2)	Generator Over Frequency
[Lo H](2)	Generator Under Frequency
[Hi U] (2)	Generator Under Voltage
[Lo U](2)	Generator Under Voltage
[XX.X]	Battery Voltage
[Err ]	Memory error

(1) **[FUEL]** This message indicates Low Fuel in the tank . The engine stops if the contacts remain closed for 5 minutes continuously.

(2) To determine the value that caused the failure, push the [F1] pushbutton.

#### 4.1 OPERATING messages

EP6 features messages to inform you about the following:

- [uuuu] Glow-plugs timing
- [U— ] Voltage out of range
- [StA-] Start prompt
- [. . . ] Starting by key switch
- [rEst] Rest timing
- [tEst] Automatic Test
- [CAL] Calibration
- [ProG] Programming
- [StOP] Stopping cycle

#### 5.0 LEDs for visual indication

The EP6 features two LEDs (**see section 10.0**) to indicate the following conditions:

**[ENGINE RUNNING]:** this green led illuminates when the engine is running.

**[AUTO]:** this yellow LED blinks to indicate a standby mode. The EP6 monitors the REMOTE CONTROL and expects a command. The LED illuminates continuously when the REMOTE START is activated.

#### 5.1 LEDs and Display Test

A test of the LEDs and DISPLAY is obtained automatically anytime the key switch is turned ON. The LEDs and DISPLAY light up for about 1 second.

#### 6.0 Parameters and settings

The unit is programmed by the supplier of the Generating Set. Contact the Generator manufacturer in order to have the permission to program the module. It is possible to read the status of the internal programming at anytime. Follow the instructions:

- A) - Turn the Key in OFF (if the display indicates [STOP], wait until it disappears)
- B) - Push the pushbutton [F1] the display will show the first programmable parameter **[P.0]**.
- C) - Push the pushbutton [F1] the display will indicate the value of the parameter ([ 1"]).
- D) - Push the pushbutton [UP-DOWN] to select a parameter. Push [F1] to display the setting.
- E) - The display returns to menu mode if you have not used the pushbuttons for 2 minutes.

The list of the parameters follows ([ ' ] means minutes and [ " ] means seconds). Some parameters may differ according to the programming done by the genset manufacturer.

Display	Parameter [Default]
[P.0]	<b>Remote Start Delay Timing (Input #7) [ 1"]</b> Range: 1-59 secs or 1-15 mins Seconds or minutes of continuous REMOTE START command to initiate the automatic engine start (see section 7.0 and [P20] in this section).
[P.1]	<b>Remote Stop Delay Timing (Input #7) [ 1"]</b> Range: 1-59 secs or 1-15 mins Seconds or minutes of continuous absence of the REMOTE START command to initiate the stop cycle (see section 7.0 and [P.20] in this section).
[P.2]	<b>Crank Timing (Output #10) [ 5"]</b> Range:1-20 seconds Maximum insertion time of the <i>Starter Motor</i> .
[P.3]	<b>Engine Running Trigger (Input #1) [ 8.0]</b> Range: 3V-24V, [inh.]. If the voltage of the Charger Alternator rises above the [setting], the <i>Starter Motor</i> is disconnected.
[P.4]	<b>Rest Timing [ 3"]</b> Range: 3-20 secs. Time interval between starting attempts
[P. 5]	<b>Starting Attempts [ 3 ]</b> Range: 1-10 This parameter sets the number of attempts in the automatic start cycle
[P.6]	<b>Generator UnderVoltage, short-circuit [ inh.]</b> Range: 80-400V. If the voltage drops under the [setting] for at least 6 secs, or under [setting]-20% for 1 sec, the Under-Voltage protection [Lo U] will shut down the engine.
[P.7]	<b>Generator Over-Voltage [500V]</b> Range: 110-550V or [inh.]. If the Generator voltage rises above the [setting] for at least 2 seconds, the EP6 will energize the over voltage protection [Hi U] (see section 4.0) to stop the engine. The [inh.] code inhibits the over voltage.
[P.8]	<b>Generator Under-Frequency [Inh.]</b> [inh.] 1 to 99Hz ([inh.]=disables the under frequency) This protection is delayed by about 6 seconds. The EP6 shuts down the engine and the display will show the [Lo H] message.
[P.9]	<b>Generator Over-Frequency [55]</b> 45 Hz to [inh.] ([inh.] disables the over frequency) This protection is delayed by about 2 seconds. The EP6 shuts down the engine and displays [Hi H]
[P.10]	<b>Current Transformer Size [...]</b> The range is 10/5 up to 1000/5
[P.11]	<b>Generator Overload Setting [inh.]</b> Range: [inh.] to 1000 AThe EP6 shuts down the engine after a delay of 6 secs and shows the message [E05].
[P.12]	<b>Generator Failure Alarm [OFF]</b> selection: [on] or [OFF].The code [on] enables the <i>Generator</i> failure alarm. The EP6 shows the [E04] message and the engine will shut down.
[P.13]	<b>Glow Plugs/Choke Control (Output #11) [ 5"]</b> Range: 1 to 99 secs.The EP6 energizes the output #11 for the programmed time.
[P.14]	<b>Output Control [ 0 ]</b> The following options are available: [ 0] None - [ 1] Choke Control - [ 2] Glow Plugs Control - [ 3] Choke Control
[P.15]	<b>Belt Break Control [ON]</b> Selection: [on] or [OFF]. The Belt Break alarm is indicated by means of the message [bELt]
[P.16]	<b>Stop Solenoid Timing [ 2"]</b> Range: 2-99 secs. Duration of the Stop cycle.

- [P.17] Alarm Output Timing [ 1']**  
[inh.] 1-59 secs 1-15 mins and [cont]. Time-out of the alarm output. The code [cont] disables the time-out, and the alarm remains energized until the OFF operating mode is selected. The [inh.] mode enables the use of the external contactor
- [P.18] Temperature Switch [n.o.]**  
Selection: [n.o.] or [n.c.]  
[n.o.] the engine shuts down if the contact closes  
[n.c.] the engine shuts down if the contact opens
- [P.19] ALARM Control [n.c.]**  
Selection: [n.o.] or [n.c.]  
[n.o.] the engine shuts down if the contact closes  
[n.c.] the engine shuts down if the contact opens
- [P.20] Remote Start [n.o.]**  
Selection: [n.o.] or [n.c.]  
[n.o.] the engine starts if the contact closes  
[n.c.] the engine starts if the contact opens
- [P.21] Under Speed setting [1200]**  
[Inh.] or 100-4000 r.p.m. The [Inh.] code disables the Under Speed shut down.
- [P.22] Over Speed setting [1700]**  
100-4000 rpm or [Inh.]. The EP6 provides one second bypass delay. The [Inh.] code (>4000 r.p.m.) disables the Over Speed shut down.
- [P.23] Number of Teeth of the Flywheel [Inh.]**  
[Inh.] or 1-500 teeth.  
The [Inh.] code disables the reading of the Speed (section 3.0), the Over/Under Speed alarms, and the Crank termination (see [P.24]).
- [P.24] Crank OFF [Inh.]**  
Crank Termination setting: 100-800 rpm  
If the speed rises above the setting, the EP6 terminates the crank cycle. One second delay avoids false termination. The code [Inh.] inhibits the crank termination
- [P.25] Low Oil Pressure Alarm By-Pass [ 6"]**  
Range: 0-99 secs. By-Pass Delay to ignore the Oil Pressure (input #3) during the engine starting cycle. This input requires normally closed contact
- [P.26] Automatic Periodic Test Cycle [inh.]**  
Range: [inh.], 1-99 days  
This is the interval time between the automatic periodic tests of the engine. The code [inh.] disables the Automatic Periodic Test (see section 19.0)
- [P.27] Automatic Engine Test Duration [ 10']**  
Range: 1-99 minutes.  
This is the duration of the automatic engine test.
- [P.28] Generator warm-up timing [ 20"]**  
Range [inh.] 1-59 secs or 1-15 mins ([inh.]=No warm-up)  
Active only when [P17]= [inh.] and the ALARM output is used to drive the contactor
- [P.29] Generator cooling timing [ 30"]**  
Range [inh.] 1-59 secs or 1-15 mins ([inh.]=No cooling)  
Active only when [P28]= [inh.] and the ALARM output is used to drive the GEN-SET contactor
- [P.30] N° poles of the alternator [...]**  
Range [inh.] - [2] = 2 pole alternator - [4] = 4 pole alternator
- [P.31] Engine shut-down delay for low fuel [5']**  
Range [inh.] = provides only optical - acoustical warning - 1 - 99 min.

**7.0 REMOTE START**

The EP6 features REMOTE START only in AUTO operating mode.

To operate the REMOTE START, follow the instructions.

- A) - Turn the KEY-SWITCH to the ON position; the Display and LEDs illuminate for 1 sec.
- B) - Wait until the end of the LEDs test.
- C) - Push the AUTO pushbutton as soon as possible (otherwise, after 20 seconds the EP6 enters the STARTING FAILURE); the [AUTO] yellow LED will illuminate as described in the section 4.

**REMOTE START SWITCH:**

If the REMOTE START input is activated, the [AUTO] yellow LED illuminates continuously and the display will indicate the count down of the internal **start delay** timer. The engine will start after the programmed **start delay** time. If the REMOTE START is deactivated, the EP6 drives the **stop delay time**. The display will indicate the count down and the [AUTO] yellow LED will flash. The engine will stop after the programmed **stop delay** time.

The EP6 will start the engine after the programmed number of days and the engine will run for the programmed time. To determine how the Automatic Periodic Test is programmed enter the Reading Mode (section 6.0 parameter [P.26] and [P.27]).

**IMPORTANT NOTES**

**If the supply (battery voltage) is removed, the EP6 loses the counts and timings. If the supply restores, the EP6 starts to count the A.P.T. according to the programmed parameters [P.26] and [P.27]. It is important to synchronize the power on sequence with the desired Automatic Periodic Test.**

**8.0 SAFETY**



**NOTE**

High voltage is present inside the EP6. To avoid electric-shock hazard, operating personnel must not remove the protective cover. Do not disconnect the grounding connection. Any interruption of the grounding connection can create an electric shock hazard. Before making external connections, always ground the PANEL first by connecting the control panel to ground.

**9.0 Automatic periodic TEST**

The EP6 does not use a clock to count the programmed days ([P.26] setting, section 6.0). The maximum error and drift of the counter is +/-0,5%. The user may experiment with shifting the periodic tests. To avoid error accumulation, and in case your unit is programmed to allow Automatic Periodic Test, we recommend the following procedures.

- disconnect the power supply of the EP6 (consult your genset supplier)
- wait for the desired start time (external clock reference)
- apply the power supply to the EP6 (consult your genset supplier)
- select the "AUTO" operating mode





## 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.**



## WARNING

For the canopy generator sets provided with doors, the following instruction shall be observed. During the normal operation, the doors of the engine compartment and/or the electrical box shall be kept closed, locked up if possible, as they must be considered in all respects as protection barriers. The access to the internal parts shall occur for maintenance purposes only, by qualified personnel and, in any case, when the engine is stopped.

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 ( $\cos \varphi$ ).

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 (THREEPHASE)

##### GENERATORS WITH CONDENSER SETTING (SINGLEPHASE)

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  $\pm 5\%$  with balanced loads and with a rotation speed variation of 4%. Particularly, with resistive loads ( $\cos \varphi = 1$ ), a voltage over-elevation occurs which, with the machine cold and at full load, can even attain +10 %, a value which in any case is halved after the first 10-15 minutes of operation.

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

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

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

#### FREQUENCY

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



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

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

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

### POWER FACTOR - $\cos \varphi$

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

For  $\cos \varphi$  values of less than 0.8 the alternator must be downgraded, since at equal apparent power the alternator should supply a greater reactive power. For reduction coefficients, contact the Technical Service Department.

### START-UP OF ASYNCHRONOUS MOTORS

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

To avoid a group oversize, we recommend following these precautionary measures:

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

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

### SINGLE-PHASE LOADS

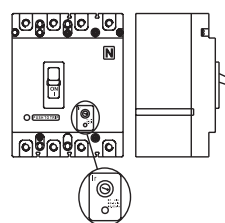
Power to monophasic utilities by means of three-phase generators requires some operating limitations.

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

### ELECTRIC PROTECTIONS

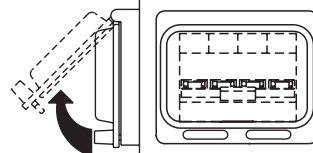
#### THERMAL-MAGNETIC SWITCH

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



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

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



Furthermore, keep in mind that the nominal operating current refers to an operating temperature of 30°C, so that each variation of 10°C

roughly corresponds to a variation of 5% on the value of nominal current.

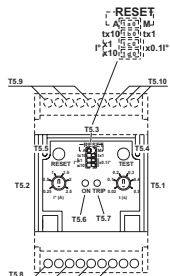
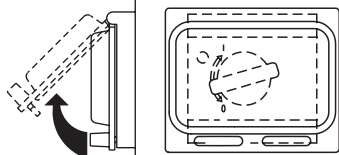
In case of an intervention on the part of the thermal magnetic protection device, check that the total absorption does not exceed the electricity-generating group's nominal current.



### DIFFERENTIAL SWITCH

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

In the case of an intervention



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

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

### THERMIC PROTECTION

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

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

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

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

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



### USAGE WITH EAS AUTOMATIC START-UP PANEL

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

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

- Perform connections on the installation in safety conditions. Position the automatic panel in RESET or LOCKED mode.
- Carry out the first start-up in MANUAL mode. Check that the generator's LOCAL START / REMOTE START switch (I6) is in the REMOTE position. Check that the generator switches are enabled (input lever in upward position).

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

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

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



## ATTENTION

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







## NOTE

The setting modifications of GFI are executed by qualified personnel. In case, contact After Sales Support. Before using the machine check the ON warning lamp lighting.

The relay allows to select the tripping current value so as to keep values of contact voltage of the limits indicated by the electrical security norms.

These adjustments allow to perform a tripping selectivity or either current or delay when more relays are located along the same line in protection of the different starting signals.

### EXCLUDING THE G.F.I.

it is possible to put off GFI supply so to be able to operate in the control panel.

**BEWARE:** this operation is allowed only under the responsibility of personnel able to activate different solutions to ensure electrical protection of the system powered by the gen-set.

### USE OF THE DER3 / 0D MODEL (MOSA SET UP)

- 1) Manual reset
- 2) Regulation of intervention time: INST (instantaneous)
- 3) Regulation of fault current: 30 mA
- 4) Output relay: N.De

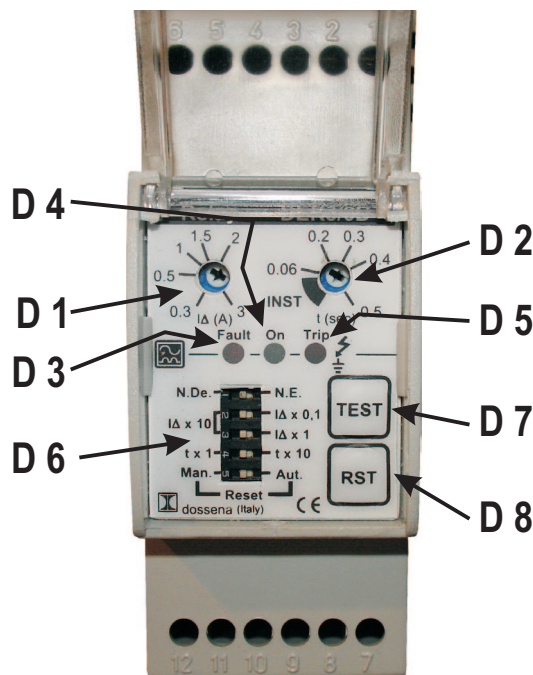
The GFI is equipped with 2 tests, 1 of which is effected automatically by the instrument:

1. manual test (trial push button)
2. automatic test of the toroid/relay connection and of the release coil.

It is able to work correctly even in presence of harmonic distortion or anyway with very disturbed signals. In case the internal temperature goes over the threshold for a good functioning, the Fault led will twinkle. Its interruption due to a fault of the toroid (break of the connection wire) or a fault in the internal circuits brings to the automatic intervention of the protection

### LEGEND:

- D1 Potentiometer for earthing fault current regulation
- D2 Potentiometer for intervention time regulation
- D3 Multifunction led for indication of: internal electronics fault / internal temperature out of range/ t(s) centred correctly.
- D4 Led indicating presence of feeding
- D5 Led indicating intervention of GFI relay
- D6 Micro-switches for setting up of the instrument
- D7 Trial push-button
- D8 Push-button for the manual reset





**NOTE**

Don not intervene on the setting of the protection switch. Before using the machine check the ON warning lamp lighting.

**USE AS TROUBLE INDICATOR:**

Placed on the front panel, the insulation monitor (A3) is a relay which controls continuously the insulation of the generation a.c. circuits towards the ground.

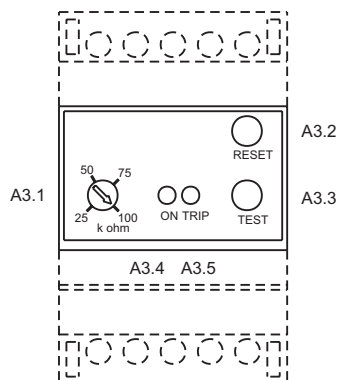
The device generates internally a continuous 12V voltage which is applied between the circuit under control and the ground.

**USE AS TROUBLE INDICATOR AND INTERVENTION:**

The insulation monitor controls a device (release coil, contactor, etc.) which opens the whole circuit, lifting voltage in the whole part of the machine a.c. generation.

**USE OF RI – R22M MODEL:**

- To vary the regulation call our Technical Assistance Department
- The LED ON shows that the device is fed.
- Check that it works correctly pressing the TEST push button
- The LED TRIP will simulate on intervention or anyway will show the real intervention in case the insulation fails.
- Reset the circuit pressing the RESET push button after having checked the plant and removed the problem cause.

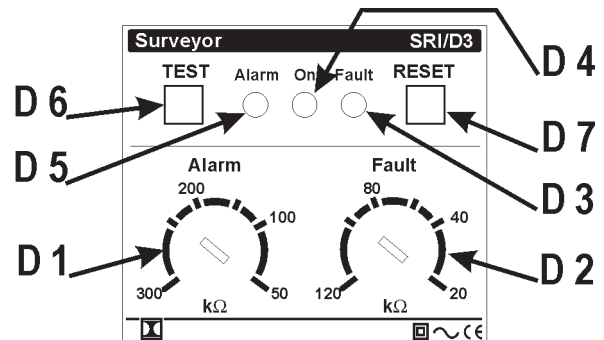


**LEGEND:**

- A3.1 - Adjustment potentiometer insulation resistance
- A3.2 - Manual reset push button
- A3.3 - Test push button
- A3.4 - Auxiliary feeding presence LED
- A3.5 - TRIP LED

**USE OF SRI/D3 MODEL**

- To vary the regulation call our Technical Assistance Department
- The warning light ON shows that the device is fed.-
- Pressing a long time the Test push-button, the Fault led lights and the Alarm led twinkles;
- Leaving it, the Alarm led goes off while the Fault led remains lit. The pressure on the Reset key brings the device back to initial conditions.
- If the insulation resistance goes down below the fixed alarm value, the Alarm led twinkles, at the same time the Alarm contact switches; if the insulation resistance goes down furtherly and becomes inferior to the fixed value for the Fault, the Fault led lights and at the same time both exchange contacts switch putting the Fault in activity and the Alarm at rest.
- After having checked the device and removed the cause of the problem, re-establish the circuit pressing the push-button RESET.



**LEGEND:**

- D1 Regulation of Alarm threshold
- D2 Regulation of Fault threshold
- D3 Led, fault indication
- D4 Led feeding indication
- D5 Led Alarm indication
- D6 Test push-button
- D7 Reset push-button

I

GB

Self-loading prearrangement

F

M

29.1

REV.0-06/10

The generators can be supplied with the fuel automatic load kit. The kit includes: the pump, the fuel level sensor (3 levels) and the control board. The kit does not include the pipes for the connection between the generator tank and the external tank as well as any safety devices (solenoid valves) necessary for installation.

### PUMP UNIT

It is usually installed on the generator set already connected to the tank and the control board. It consists of an electric pump and a manual backup pump connected by a series of pipes. Two unidirectional valves allow to realize a connection bypass between the two pumps.

ELECTRIC PUMP	
Flow / Head	35 / 1
Q=lt./min / h=m	30 / 5
	20 / 10
	15 / 12
	10 / 15
Supply voltage	Single phase 230Vac
Power	0,35 kW (0,5 HP)
MANUAL PUMP	
Flow lt./cycle	0,174

### FUEL LEVEL SENSOR (3 LEVELS)

It is installed on the generator tank and connected to the control board.

The 1st level (START) provides the signal to start the pump.

The 2nd level (STOP) provides the signal to stop the pump.

The 3rd level (OVERFLOW) provides an alarm signal and stops the pump.

### CONTROL BOARD

Usually it is placed near the pump in an easily accessible and protected position. It allows the fuel loading in the two possible modes of operation: automatic and manual. The board is provided with some signaling LEDs: ON Led (power on), PUMP RUNNING Led, START Led (pump start), STOP Led (pump stop), OVERFLOW ALARM Led.



### OPERATION

The operating mode is selected by means of a three-position switch Aut-0-Man.

#### Manual Position -

By turning the manual switch in this position the pump is started. The selector turns back to zero when releasing it. In manual mode, the pump is stopped only when reaching the 3rd level of the fuel sensor.

#### Automatic Position -

When the fuel decreases to level 1, the pump is started and kept running until the 2nd level is reached. In the event that fuel is reaching the level 3 (OVERFLOW) the pump is stopped and an alarm is generated.

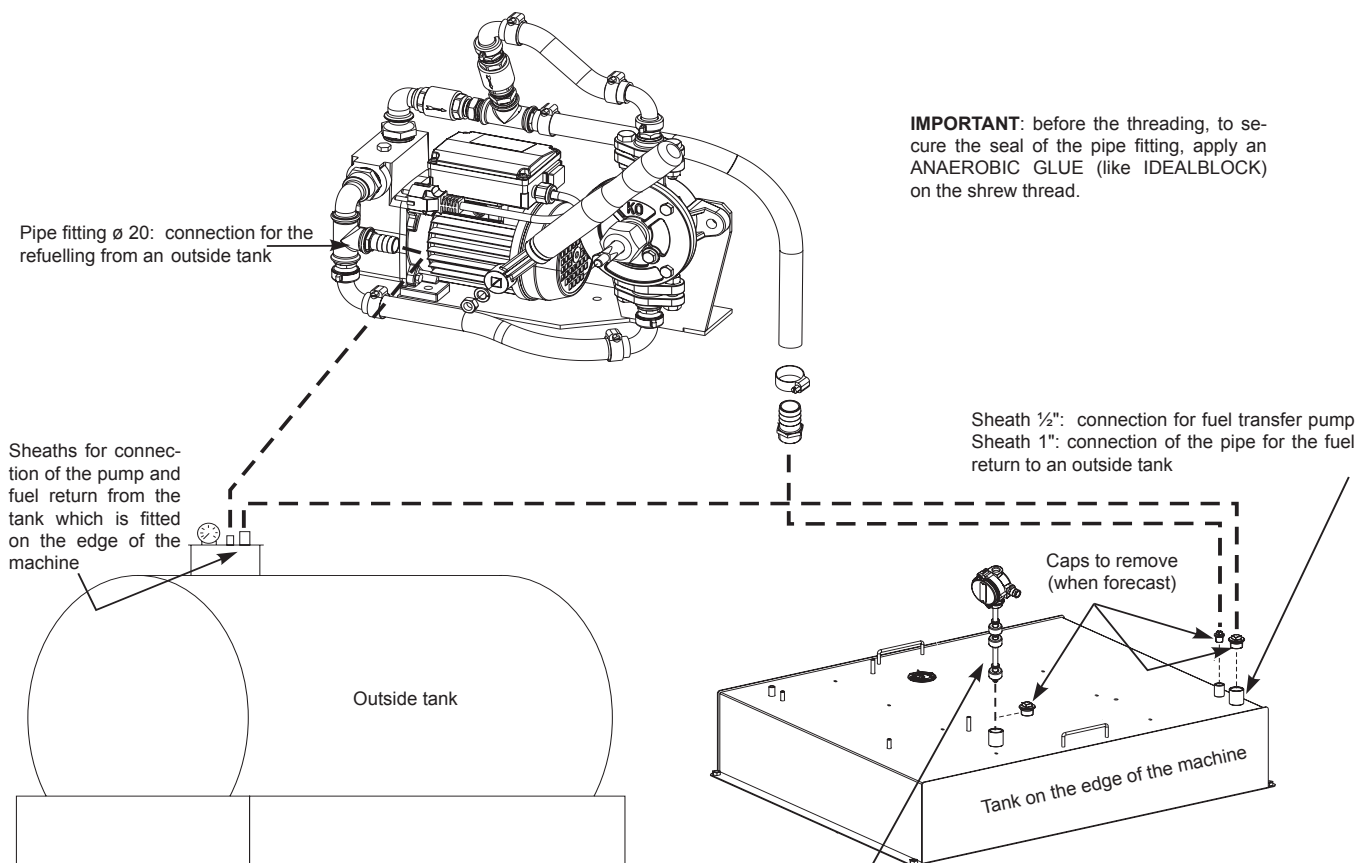
#### Zero Position -

No function.

The following is a simplified diagram of the fuel feed circuit.



The purpose of this diagram is only to provide guidance. The design and implementation of the entire system must be performed by qualified personnel familiar with the specific rules applicable to the installation site.

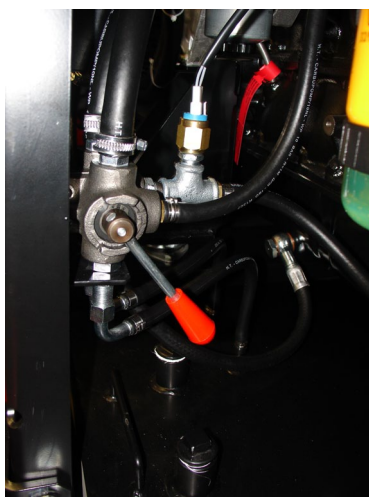


Fuel level gauge. The level gauge has to connected to the PCB control transfer pump (see the specific electric diagram)

This system allows to feed the motor of the generator both from its own tank and from an external tank of greater capacity.

It consists mainly of two parts:

- a three-way valve for the selection of the tank;
- two hydraulic type quick disconnect couplings for the connection of the hoses from the external tank.



## ATTENTION

The fuel conveying, including that from the external tank, is always controlled by the engine fuel pump, so it is recommended to comply with the instructions below to get proper operation:

- place the external tank at the same level of the generator ;
- the minimum diameter of the connecting hoses must be 15 mm;
- the maximum length of the connecting hoses must be 5m.

A pressure sensor on the return pipe of the engine fuel protects the system in the event of overpressure due to a wrong position of the three-way valve. The activation of the protection does not allow the engine start or stops it immediately. An alarm of the type “emergency button” is given.

The hydraulic quick couplers size is 3/8-Inch Gas, the corresponding connections are supplied with the system. If not connected cover the quick-couplers with their caps, to protect them from dust or dirt.



## MAKE SURE

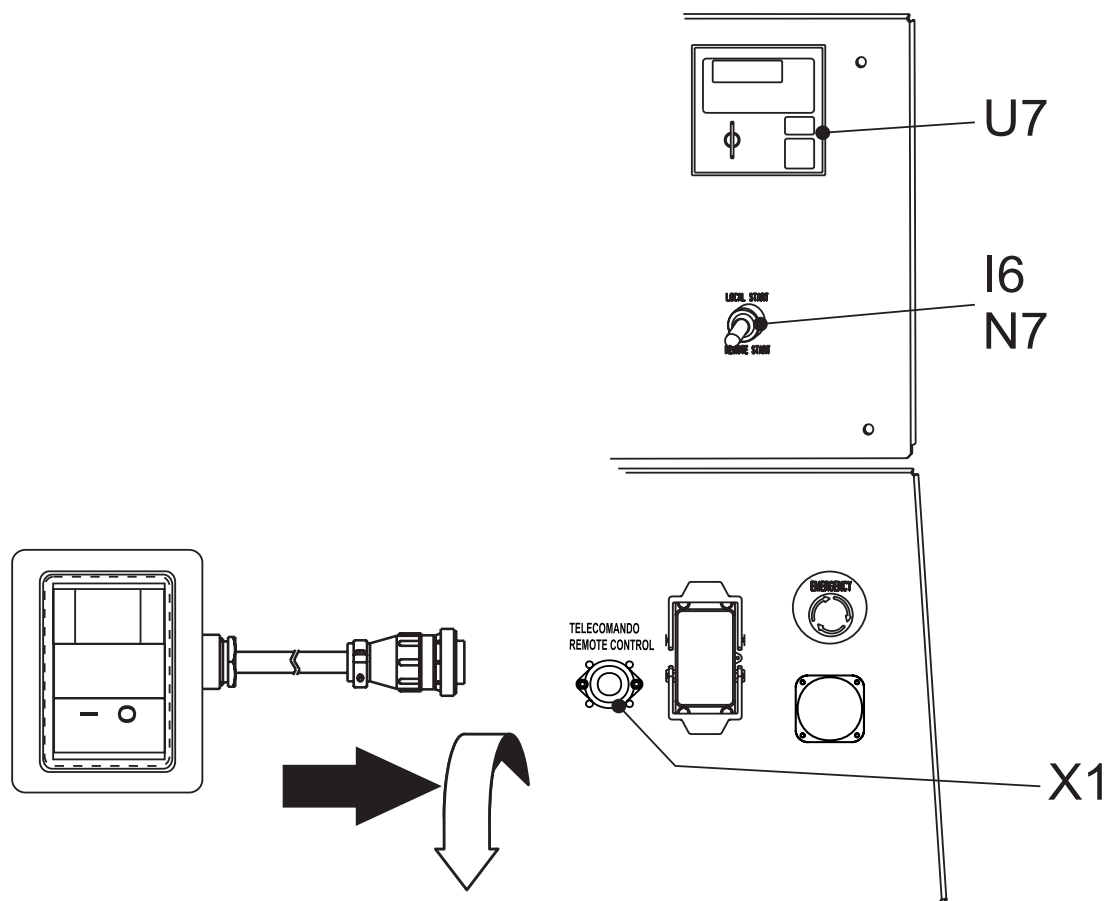
- The selector LOCAL START/REMOTE START (I6) of the generating set must be switched on LOCAL-START.
- Put the selector „switch board (N7)“ on ON.

The coupling of the TCM 35 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 (X1), and/or rear plate, with a multiple connector.

**N.B.** The remote control TCM 35 can be used only with machines equipped with control and protection device EP6 (U7).

For use of TCM 35 see page M21 (start and stop) of this manual.





 <b>WARNING</b>		
	<ul style="list-style-type: none"> <li>• Have <b>qualified</b> personnel do maintenance and troubleshooting work.</li> <li>• Stop the engine before doing any work inside the machine. If for any reason the machine must be operated while working inside, <b>pay attention</b> moving parts, hot parts (exhaust manifold and muffler, etc.) electrical parts which may be unprotected when the machine is open.</li> <li>• Remove guards only when necessary to perform maintenance, and replace them when the maintenance requiring their removal is complete.</li> <li>• Use suitable tools and clothes.</li> <li>• Do not modify the components if not authorized.</li> </ul> <p>- See pag. M1.1 -</p>	
<b>MOVING PARTS can injure</b>		<b>HOT surface can hurt you</b>

**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 manufacturer.

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.

maintenance intervals and specific checks for each model: it is necessary to consult the specific engine or alternator USER AND MAINTENANCE manual.

**VENTILATION**

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

**ELECTRICAL PANELS**

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

**DECALS AND LABELS**

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

**STRENUOUS OPERATING CONDITIONS**



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

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

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

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

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


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

**ENGINE and ALTERNATOR**

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

Every engine and alternator manufacturer has



 <b>NOTE</b>
<p>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.</p>




## 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

	<b>EVERY WEEK</b>	<b>EVERY MONTH AND/OR AFTER INTERVENTION ON LOAD</b>	<b>EVERY YEAR</b>
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.**



<i>Problem</i>	<i>Possible cause</i>	<i>Solution</i>
<b>ENGINE</b>		
The motor does not start up	<ol style="list-style-type: none"> <li>1) Start-up switch (I6) (where it is assembled) in incorrect position</li> <li>2) Emergency button (L5) pressed</li> <li>3) Preheating (where it is assembled)</li> <li>4) Engine control unit or starting key faulty.</li> <li>5) Battery low</li> <li>6) Battery cable terminals loose or corroded</li> <li>7) Start-up motor defective</li> <li>8) No fuel or air in feed circuit</li> <li>9) Malfunction on feed circuit: defective pump, injector blocked, etc.</li> <li>10) Air filter or fuel filter clogged</li> <li>11) Air in the gasoil filter.</li> <li>12) Motor stopping device defective</li> <li>13) Malfunction on electrical power circuit on generator control panel</li> </ol>	<ol style="list-style-type: none"> <li>1) Check position</li> <li>2) Unblock</li> <li>3) Lacking or insufficient preheating phase for sparkplugs. Malfunction in circuit: repair.</li> <li>4) Replace</li> <li>5) Recharge or replace. Check the battery charge circuit on motor and automatic panel.</li> <li>6) Tighten and clean. Replace if corroded.</li> <li>7) Repair or replace.</li> <li>8) Refill tank, un-aerate the circuit.</li> <li>9) Ask for intervention of Service Department.</li> <li>10) Clean or replace</li> <li>11) Take the air out filling the filter with gasoil.</li> <li>12) Replace.</li> <li>13) Check and repair.</li> </ol>
The motor does not accelerate. Inconstant speed.	<ol style="list-style-type: none"> <li>1) Air filter or fuel filter clogged.</li> <li>2) Malfunction on feed circuit: defective pump, injector blocked, etc.</li> <li>3) Oil level too high.</li> <li>4) Motor speed regulator defective.</li> </ol>	<ol style="list-style-type: none"> <li>1) Clean or replace.</li> <li>2) Ask for intervention of Service Department.</li> <li>3) Eliminate excess oil.</li> <li>4) Ask for intervention of Service Department</li> </ol>
Black smoke	<ol style="list-style-type: none"> <li>1) Air filter clogged.</li> <li>2) Overload.</li> <li>3) Injectors defective. Injection pump requires calibration.</li> </ol>	<ol style="list-style-type: none"> <li>1) Clean or replace</li> <li>2) Check the load connected and diminish.</li> <li>3) Ask for intervention of Service Department.</li> </ol>
White smoke	<ol style="list-style-type: none"> <li>1) Oil level too high.</li> <li>2) Motor cold or in prolonged operation with little or no load.</li> <li>3) Segments and/or cylinders worn out.</li> </ol>	<ol style="list-style-type: none"> <li>1) Eliminate excess oil.</li> <li>2) Insert load only with motor sufficiently hot</li> <li>3) Ask for intervention of Service Department.</li> </ol>
Too little power provided by motor.	<ol style="list-style-type: none"> <li>1) Air filter clogged.</li> <li>2) Insufficient fuel distribution, impurities or water in feed circuit.</li> <li>3) Injectors dirty or defective.</li> </ol>	<ol style="list-style-type: none"> <li>1) Clean or replace.</li> <li>2) Check the feed circuit, clean and refill once again.</li> <li>3) Ask for intervention of Service Department.</li> </ol>
Low oil pressure	<ol style="list-style-type: none"> <li>1) Oil level insufficient</li> <li>2) Air filter clogged.</li> <li>3) Oil pump defective.</li> <li>4) Alarm malfunction.</li> </ol>	<ol style="list-style-type: none"> <li>1) Reset level. Check for leaks.</li> <li>2) Replace filter.</li> <li>3) Ask for intervention of Service Department.</li> <li>4) Check the sensor and electrical circuit.</li> </ol>
High temperature	<ol style="list-style-type: none"> <li>1) Overload</li> <li>2) Insufficient ventilation.</li> <li>3) Insufficient coolant liquid (Only for water cooled motors)</li> <li>4) Water radiator or oil clogged (where it is assembled)</li> <li>5) Water circulating pump defective (Only for water cooled motors)</li> <li>6) Injectors defective. Injection pump requires calibration</li> <li>7) Alarm malfunction</li> </ol>	<ol style="list-style-type: none"> <li>1) Check the load connected and diminish.</li> <li>2) Check the cooling vent and relative transmission belts</li> <li>3) Restore level. Check for leaks or breakage in the entire cooling circuit, pipes, couplings, etc.</li> <li>4) Clean cooling fins on radiator</li> <li>5) Ask for intervention of Service Department</li> <li>6) Ask for intervention of Service Department</li> <li>7) Check the sensor and electrical circuit</li> </ol>

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
<b>GENERATOR</b>		
Absence of output voltage	1) Voltage switch in position 0 2) Voltage switch faulty  3) Protection tripped due to overload 4) Differential protection device tripped. (Differential switch, differential relay)  5) Protection devices defective 6) Alternator not sparked  7) Alternator defective	1) Check position 2) Check connections and working of the switch, repair or replace 3) Check the load connected and diminish 4) Check on the entire installation: cables, connections, utilities connected have no defective sheathing which may cause incorrect currents to ground 5) Replace 6) Carry out external spark test as indicated in alternator manual. Ask for intervention of Service Department 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 2) Voltage regulating device (where it is assembled) defective or requires calibration 3) Alternator defective	1) Regulate speed to its nominal no-load value 2) Adjust regulator device as indicated in alternator manual, or replace. For generators with double voltage control AVR and COMPOUND, act on the excitation circuit as shown in the alternator manual. 3) Check winding, diodes, etc. on alternator (Refer to alternator manual) Repair or replace Ask for intervention of Service Department
Corrected no-load voltage too low with load	1) Incorrect motor running speed due to overload 2) Load with $\cos \varphi$ less than 0.8 3) Alternator defective	1) Check the load connected and diminish 2) Reduce or rephase load 3) Check winding, diodes, etc. on alternator (Refer to alternator manual) Repair or replace Ask for intervention of Service Department
Unstable tension	1) Contacts malfunctioning 2) Irregular rotation of motor 3) Alternator defective	1) Check electrical connections and tighten 2) Ask for intervention of Service Department 3) Check winding, diodes, etc. on alternator (Refer to alternator manual) Repair or replace Ask for intervention of Service Department

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

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

### GASOLINE ENGINE

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

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

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

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

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

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

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

### DIESEL ENGINE

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

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

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

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

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



## IMPORTANT



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

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

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

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

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

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

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



**Particular attention must be paid when getting rid of:**  
**lubricating oils, battery electrolyte, and inflammable liquids such as fuel, cooling liquid.**

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

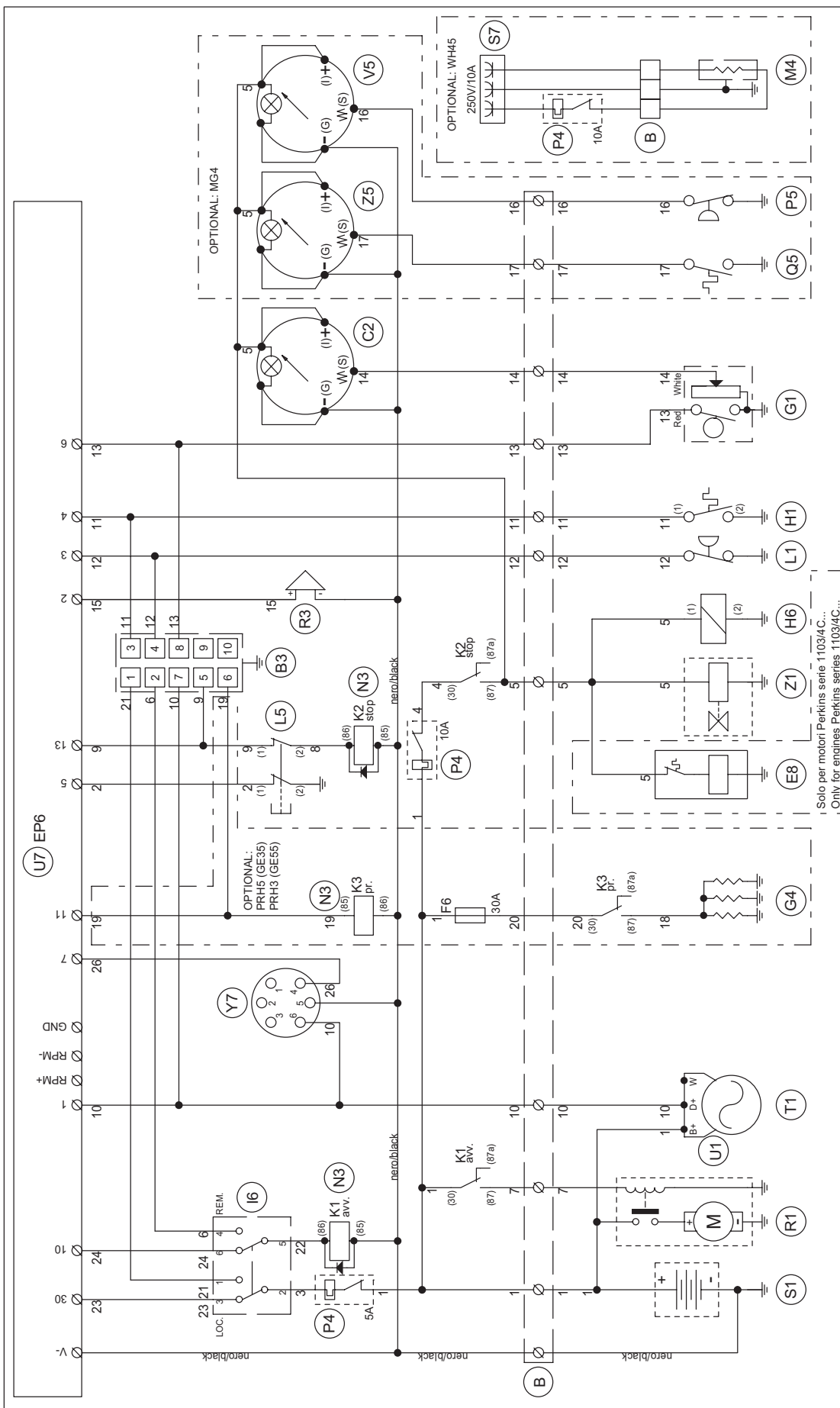
In case the machine should be cust off without any previous disassembly it is however compulsory to remove:

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

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

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

A	: Alternator	F3	: Stop push-button	L6	: Choke button
B	: Wire connection unit	G3	: Ignition coil	M6	: Switch CC/CV
C	: Capacitor	H3	: Spark plug	N6	: Connector – wire feeder
D	: G.F.I.	I3	: Range switch	O6	: 420V/110V 3-phase transformer
E	: Welding PCB transformer	L3	: Oil shut-down button	P6	: Switch IDLE/RUN
F	: Fuse	M3	: Battery charge diode	Q6	: Hz/V/A analogic instrument
G	: 400V 3-phase socket	N3	: Relay	R6	: EMC filter
H	: 230V 1phase socket	O3	: Resistor	S6	: Wire feeder supply switch
I	: 110V 1-phase socket	P3	: Sparkler reactor	T6	: Wire feeder socket
L	: Socket warning light	Q3	: Output power unit	U6	: DSP chopper PCB
M	: Hour-counter	R3	: Electric siren	V6	: Power chopper supply PCB
N	: Voltmeter	S3	: E.P.4 engine protection	Z6	: Switch and leds PCB
P	: Welding arc regulator	T3	: Engine control PCB	W6	: Hall sensor
Q	: 230V 3-phase socket	U3	: R.P.M. electronic regulator	X6	: Water heater indicator
R	: Welding control PCB	V3	: PTO HI control PCB	Y6	: Battery charge indicator
S	: Welding current ammeter	Z3	: PTO HI 20 l/min push-button	A7	: Transfer pump selector AUT-0-MAN
T	: Welding current regulator	W3	: PTO HI 30 l/min push-button	B7	: Fuel transfer pump
U	: Current transformer	X3	: PTO HI reset push-button	C7	: "GECO" generating set test
V	: Welding voltage voltmeter	Y3	: PTO HI 20 l/min indicator	D7	: Flooting with level switches
Z	: Welding sockets	A4	: PTO HI 30 l/min indicator	E7	: Voltmeter regulator
X	: Shunt	B4	: PTO HI reset indicator	F7	: WELD/AUX switch
W	: D.C. inductor	C4	: PTO HI 20 l/min solenoid valve	G7	: Reactor, 3-phase
Y	: Welding diode bridge	D4	: PTO HI 30 l/min solenoid valve	H7	: Switch disconnecter
A1	: Arc striking resistor	E4	: Hydraulic oil pressure switch	I7	: Solenoid stop timer
B1	: Arc striking circuit	F4	: Hydraulic oil level gauge	L7	: "VODIA" connector
C1	: 110V D.C./48V D.C. diode bridge	G4	: Preheating glow plugs	M7	: "F" EDC4 connector
D1	: E.P.1 engine protection	H4	: Preheating gearbox	N7	: OFF-ON-DIAGN. selector
E1	: Engine stop solenoid	I4	: Preheating indicator	O7	: DIAGNOSTIC push-button
F1	: Acceleration solenoid	L4	: R.C. filter	P7	: DIAGNOSTIC indicator
G1	: Fuel level transmitter	M4	: Heater with thermostat	Q7	: Welding selector mode
H1	: Oil or water thermostat	N4	: Choke solenoid	R7	: VRD load
I1	: 48V D.C. socket	O4	: Step relay	S7	: 230V 1-phase plug
L1	: Oil pressure switch	P4	: Circuit breaker	T7	: V/Hz analogic instrument
M1	: Fuel warning light	Q4	: Battery charge sockets	U7	: Engine protection EP6
N1	: Battery charge warning light	R4	: Sensor, cooling liquid temperature	V7	: G.F.I. relay supply switch
O1	: Oil pressure warning light	S4	: Sensor, air filter clogging	Z7	: Radio remote control receiver
P1	: Fuse	T4	: Warning light, air filter clogging	W7	: Radio remote control transmitter
Q1	: Starter key	U4	: Polarity inverter remote control	X7	: Isometer test push-button
R1	: Starter motor	V4	: Polarity inverter switch	Y7	: Remote start socket
S1	: Battery	Z4	: Transformer 230/48V	A8	: Transfer fuel pump control
T1	: Battery charge alternator	W4	: Diode bridge, polarity change	B8	: Ammeter selector switch
U1	: Battery charge voltage regulator	X4	: Base current diode bridge	C8	: 400V/230V/115V commutator
V1	: Solenoid valve control PCB	Y4	: PCB control unit, polarity inverter	D8	: 50/60 Hz switch
Z1	: Solenoid valve	A5	: Base current switch	E8	: Cold start advance with temp. switch
W1	: Remote control switch	B5	: Auxiliary push-button ON/OFF	F8	: START/STOP switch
X1	: Remote control and/or wire feeder socket	C5	: Accelerator electronic control	G8	: Polarity inverter two way switch
Y1	: Remote control plug	D5	: Actuator	H8	: Engine protection EP7
A2	: Remote control welding regulator	E5	: Pick-up	I8	: AUTOIDLE switch
B2	: E.P.2 engine protection	F5	: Warning light, high temperature	L8	: AUTOIDLE PCB
C2	: Fuel level gauge	G5	: Commutator auxiliary power	M8	: A4E2 ECM engine PCB
D2	: Ammeter	H5	: 24V diode bridge	N8	: Remote emergency stop connector
E2	: Frequency meter	I5	: Y/▲ commutator	O8	: V/A digital instruments and led VRD PCB
F2	: Battery charge transformer	L5	: Emergency stop button	P8	: Water in fuel
G2	: Battery charge PCB	M5	: Engine protection EP5	Q8	: Battery disconnect switch
H2	: Voltage selector switch	N5	: Pre-heat push-button	R8	: Inverter
I2	: 48V a.c. socket	O5	: Accelerator solenoid PCB	S8	: Overload led
L2	: Thermal relay	P5	: Oil pressure switch	T8	: Main IT/TN selector
M2	: Contactor	Q5	: Water temperature switch	U8	: NATO socket 12V
N2	: G.F.I. and circuit breaker	R5	: Water heater	V8	: Diesel pressure switch
O2	: 42V EEC socket	S5	: Engine connector 24 poles	Z8	: Remote control PCB
P2	: G.F.I. resistor	T5	: Electronic GFI relais	W8	: Pressure turbo protection
Q2	: T.E.P. engine protection	U5	: Release coil, circuit breaker	X8	: Water in fuel sender
R2	: Solenoid control PCB	V5	: Oil pressure indicator	Y8	: EDC7-UC31 engine PCB
S2	: Oil level transmitter	Z5	: Water temperature indicator	A9	: Low water level sender
T2	: Engine stop push-button T.C.1	W5	: Battery voltmeter	B9	: Interface card
U2	: Engine start push-button T.C.1	X5	: Contactor, polarity change	C9	: Limit switch
V2	: 24V c.a. socket	Y5	: Commutator/switch, series/parallel	D9	: Starter timing card
Z2	: Thermal magnetic circuit breaker	A6	: Commutator/switch	E9	: Liquid pouring level float
W2	: S.C.R. protection unit	B6	: Key switch, on/off	F9	: Under voltage coil
X2	: Remote control socket	C6	: QEA control unit	G9	: Low water level warning light
Y2	: Remote control plug	D6	: Connector, PAC	H9	: Chopper driver PCB
A3	: Insulation monitoring	E6	: Frequency rpm regulator	I9	:
B3	: E.A.S. connector	F6	: Arc-Force selector	L9	:
C3	: E.A.S. PCB	G6	: Device starting motor		
D3	: Booster socket	H6	: Fuel electro pump 12V c.c.		
E3	: Open circuit voltage switch	I6	: Start Local/Remote selector		



Esp. Exp.		Modifica Modification		Data Date		B.F.	
				24.11.2011			
		Denominazione: Denomination:		74035.prg			
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		Macchina: Machine:		Leporace N.			
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		Dis. n. n.º: Dwg. n.º:		2			
		Pag. n.º: Page n.º:		6			
		Project:		74035.prg			
		Date:		02.03.2007			
		Designatore: Designer:		Leporace N.			
		Approvato: Approved:					

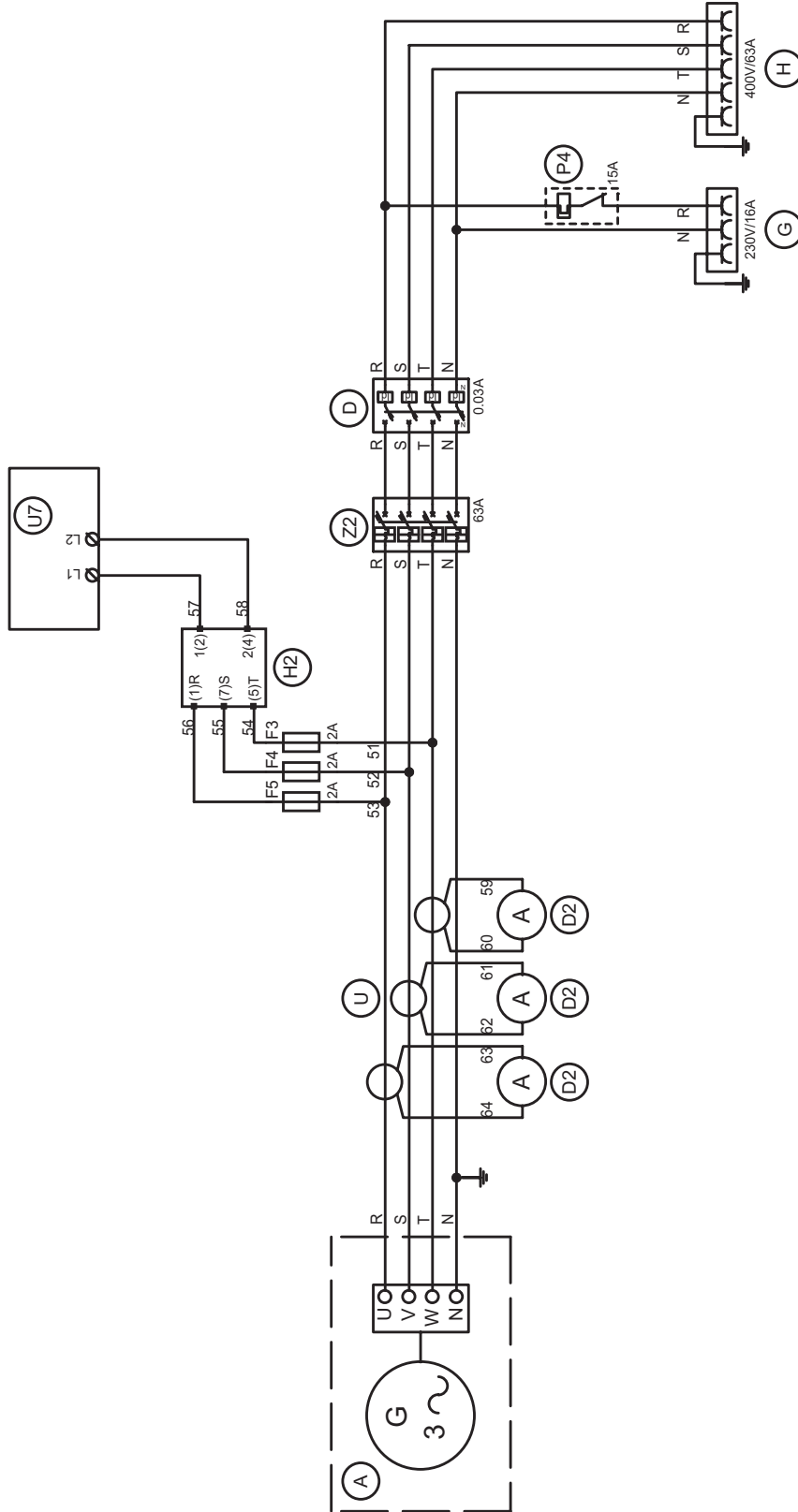


(I) Schema elettrico  
 (GB) Electric diagram  
 (F) Schema électriques

(D) Stromlaufplan  
 (E) Esquema eléctrica  
 (NL)

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		Aux. (400T/230M) DMT		3	6
		Macchina: Machine:	Dis. n. n.°	Approvato: Approved:	
		Leporace N.	Date: 17.01.2006		





# MOSA

GRUPPI ELETTROGENI

MOTOSALDATRICI

[WWW.MOSA.IT](http://WWW.MOSA.IT)

MOSA div. della BCS S.p.A.  
Stabilimento di Viale Europa, 59  
20090 Cusago (MI) Italia

Tel. + 39 - 0290352.1  
Fax + 39 - 0290390466



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