



USE AND MAINTENANCE MANUAL

TRANSLATION OF THE ORIGINAL INSTRUCTIONS — ENGLISH

CS 350 KSX CC/CV

- Motosaldatrice
- Engine Driven Welder
- Motosoudeuse
- Motosoldadoras
- Schweißaggregat
- Motosoldadora
- По Вышкам
- Lassers

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MADE IN ITALY



MOSA Weld

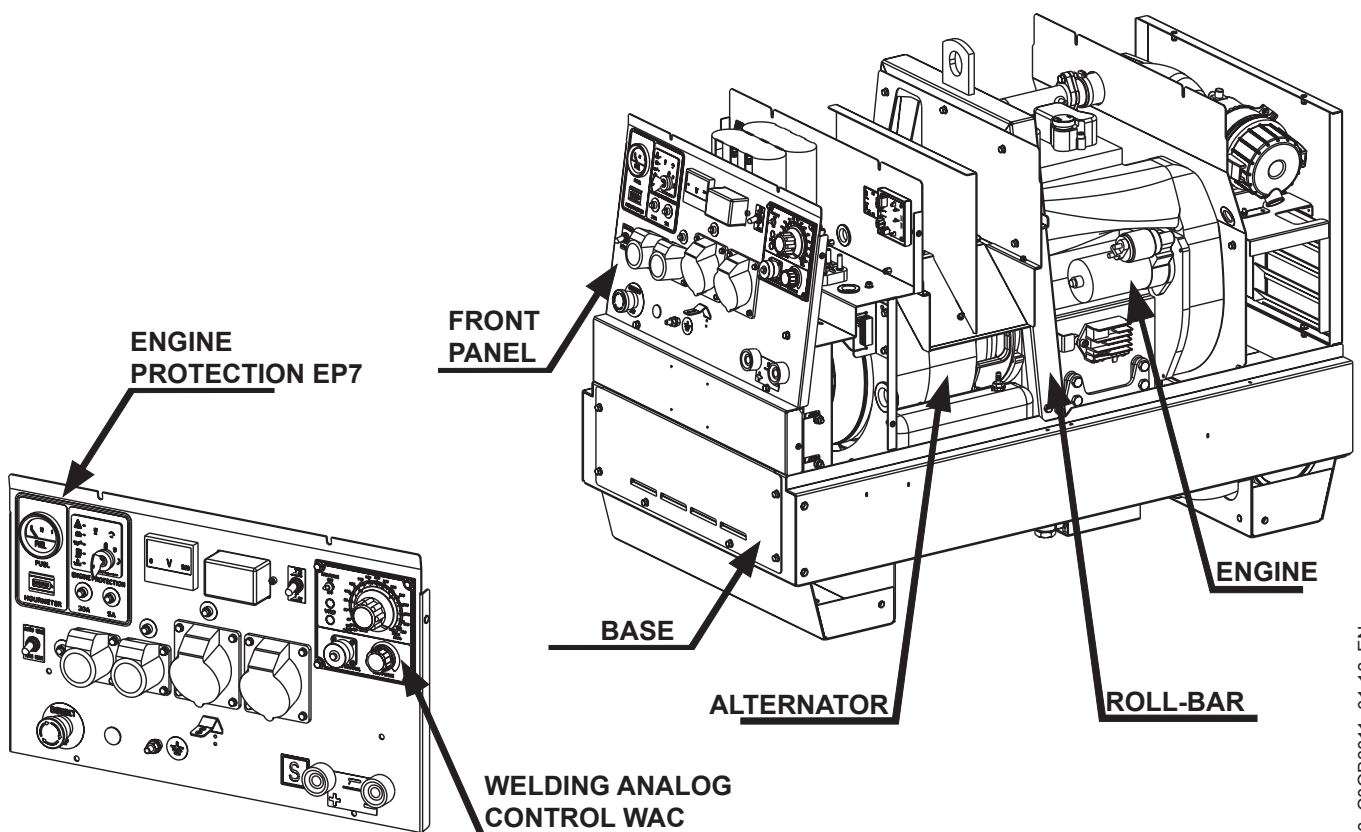
The engine driven welder is a unit which ensures the function as:

- a) a current source for are welding
- b) a current source for the auxiliary generation

The welding generator set is a source of DC electric power, driven by an internal combustion engine, which allows to perform arc welding processes with different types of electrodes and, with the CC/CV version, also wire welding. Besides, the generation set can provide ac 50 Hz auxiliary power, both three-phase and single phase, usable for the various needs associated with the welding. The engine which drives the generator set is a two-cylinder diesel type, air cooled, while the alternator is an asynchronous three-phase type. The welding current control is performed by means of a high frequency (20 kHz) "Chopper System", while the regulation board is implemented with analogue technology.

From a mechanical viewpoint, the machine is composed of a bundled basement and a roll-bar, which support the engine-alternator assembly. The canopy includes a protection cover for the front panel and two lateral doors intended to allow the routine maintenance operations. For the extraordinary maintenance the canopy can be removed in a fairly simple way.

On the front panel there are the engine protection unit (EP7) and the welding control unit (WAC). Located on EP7 there are the start key and a few indicator lights which monitor the engine status. The WAC hosts the regulation knob of the welding current (which regulates also the welding voltage in the CC/CV version) and the arc force knob. The auxiliary power sockets and the welding sockets are also placed on the front panel.



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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).

The Manufacturer shall not be liable for ANY USE OF THE PRODUCT OTHER THAN THAT PRECISELY SPECIFIED IN THIS MANUAL and is thus not liable for any risks which may occur as a result of IMPROPER USE. The Company does not assume any liability for any damage to persons, animals or property.

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:** *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.

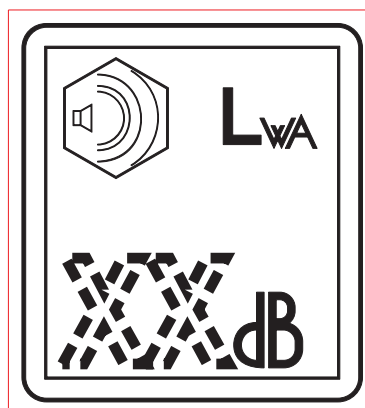
	Made in UE-ITALY	TYPE	
	SERIAL N°		
	X		
	I ₂ (A)		
	U ₀	U ₂ (V)	
	I ₂ (A)		
	U ₀	U ₂ (V)	
	Hz	kVA	
	P.F.	V (V)	
		I (A)	
	n	RPM	n ₁
	n ₀	RPM	P _{1max}
		IP	
		KW	I. CL.

	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

	TYPE	
	SERIAL N°	Made in UE-ITALY
	TYPE/N°	
	VOLTAGE(V)	
	POWER(W)	
	Hz	KVA
	P.F.	V(V)
	I.C.L.	I(A)
	LTP POWER IN ACCORDANCE WITH ISO 8528	
	n	RPM
	P _{max}	TEMP. °C
		ALTIT. m
		IP
		Kg

	Made in UE-ITALY	I. CL.	
	IEC 60974-1	IP	
	U ₀		
	X	I ₂	U ₂
	n	RPM	n ₁
	n ₀	RPM	P _{1max}
		RPM	kw
	P	V	I

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

CS 350 KSX CC/CV

GENERATOR

Three-phase generation	10 kVA / 400 V / 14.4 A
Single-phase generation	5 kVA / 230 V / 21.7 A
Single-phase generation	2.5 kVA / 110 V / 22.7 A
Single-phase generation	5 kVA / 48 V / 104 A
Frequency	50 Hz
Cos φ	0.9


ALTERNATOR

	Self-excited, self-regulated
Type	three-phase, asynchronous
Insulating class	H

ENGINE

Mark / Model	Kohler KD477.2
Type / Cooling system	Diesel 4-stroke / air
Cylinders / Displacement	2 / 954 cm ³
Output max	14 kW (19 HP)
Speed	3000 rpm
Fuel consumption	2.5 l/h
Engine oil capacity	3 l
Starter	Electric

GENERAL SPECIFICATIONS

Tank capacity	38 l
Running time (at duty cycle 60%)	15.2 h
Protection	IP 23
*Dimensions / max. Lxwxh (mm)	1230x690x925
*Weight	345 Kg
Measured acoustic power L _{WA} (pressure L _{pA})	94 dB(A) (69 dB(A) @ 7 m) 
Guaranteed acoustic power L _{WA} (pressure L _{pA})	95 dB(A) (70 dB(A) @ 7 m)

* Dimensions and weight are inclusive of all parts without wheels and towbar (CTM).

POWER

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

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

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

ACOUSTIC POWER LEVEL

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

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

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


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

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

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

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

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

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



Technical data

CS 350 KSX CC/CV

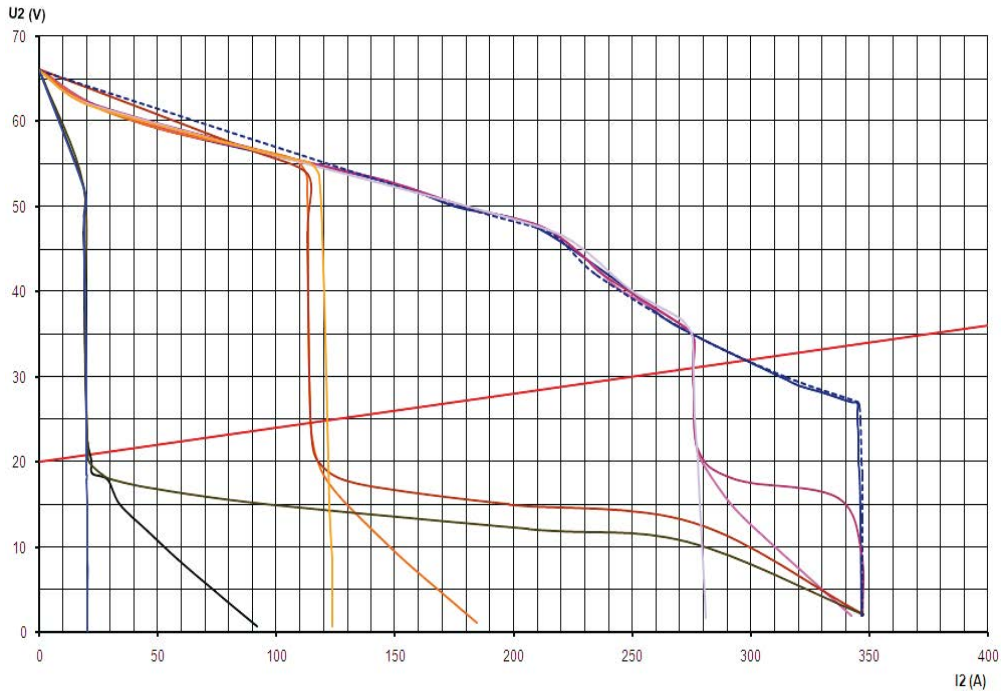
C.C. WELDING

Duty cycle 350A/35% - 300A/60% - 250A/100%
 Welding current electronic regulation 20 - 350A
 Open circuit voltage 66V

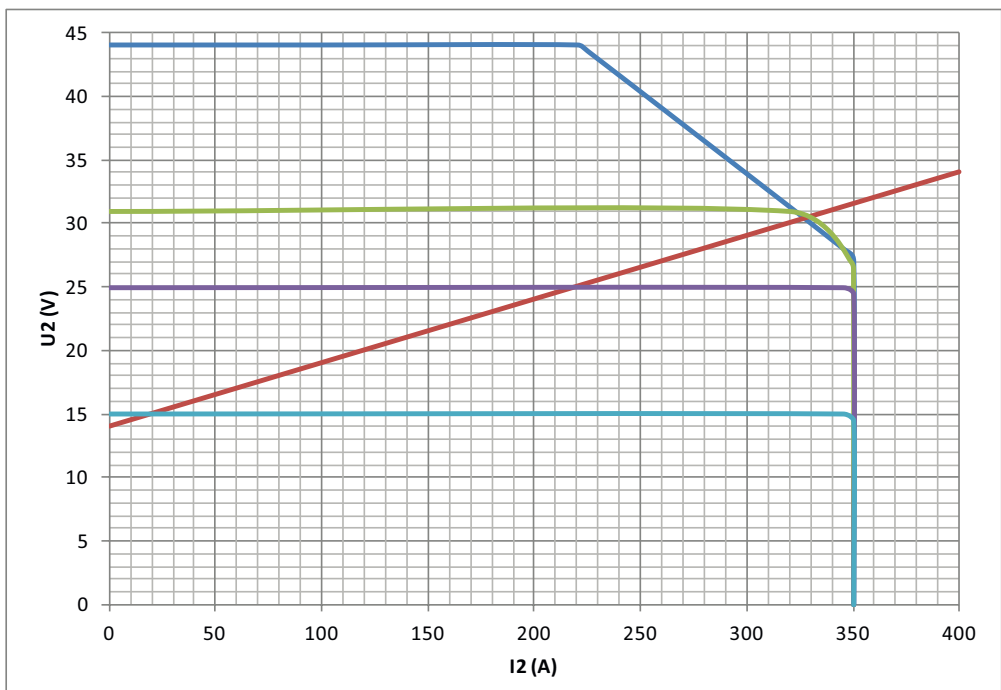
C.V. WELDING

Duty cycle 300A/60% - 250A/100%
 Welding voltage regulation 14V - 44V

C.C. STATIC CHARACTERISTICS



C.V. STATIC CHARACTERISTICS



SIMULTANEOUS UTILISATION LIMITS

WELDING CURRENT (CC) [A]	0	50	100	150	200	250	300	350
AUXILIARY POWER 3-PHASE [Kw]	8.0	8.0	7.0	5.5	3.5	2.0	0	0
AUXILIARY POWER SINGLE PHASE [Kw]	4.0	4.0	4.0	4.0	3.5	2.0	0	0

The installation and general warnings regarding operations are aimed achieving correct use of the machine and/or apparatus in the place where it is used as a genset and/or motor welder.

- Advice to the User about the safety:

 NB: The information contained in the manual can be changed without notice.

Any damage caused in connection with the use of these instructions shall not be considered as they 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.

 **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.



 **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.

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 authorized 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.

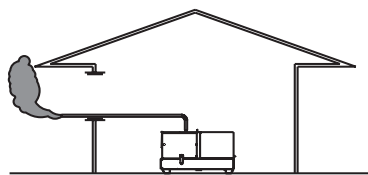
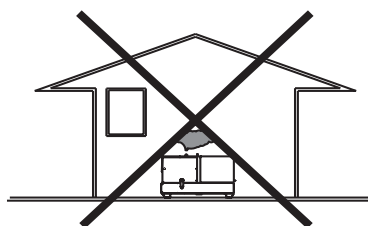
INSTALLATION AND ADVICE BEFORE USE

GASOLINE ENGINES

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

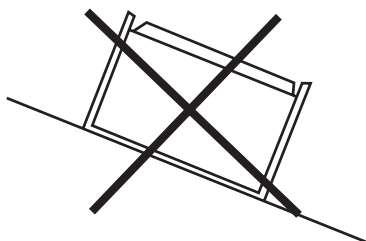
DIESEL ENGINES

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

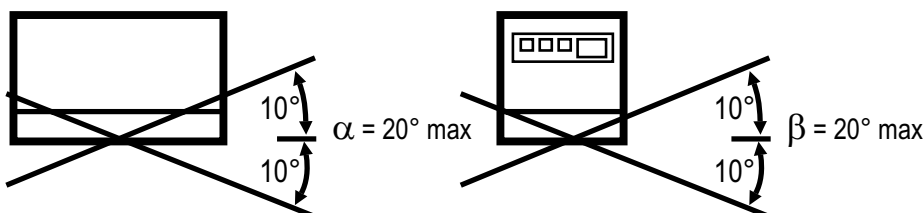


POSITION

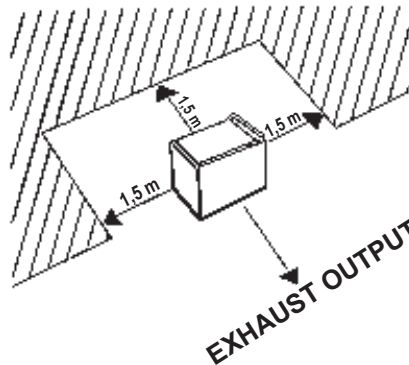
Place the machine on a level surface at a distance of at least 1,5 m from buildings or other plants.



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

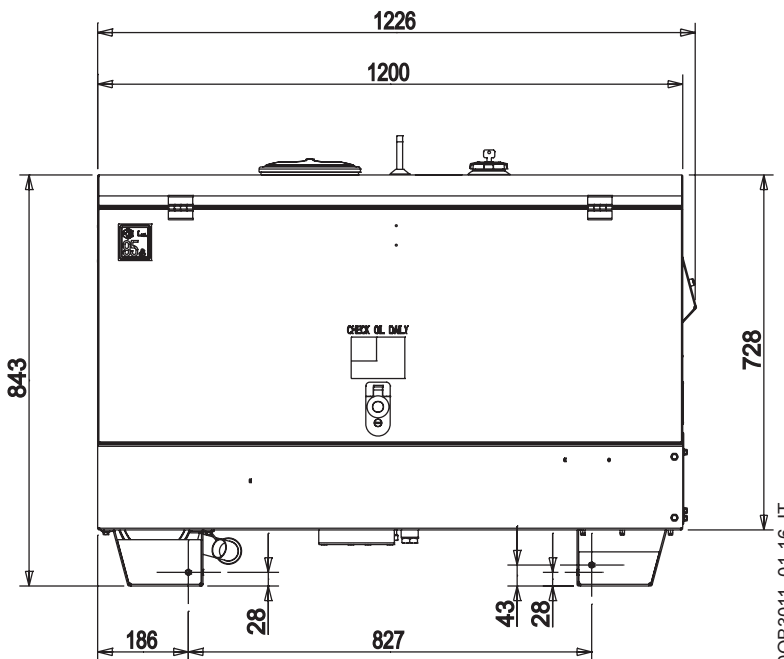
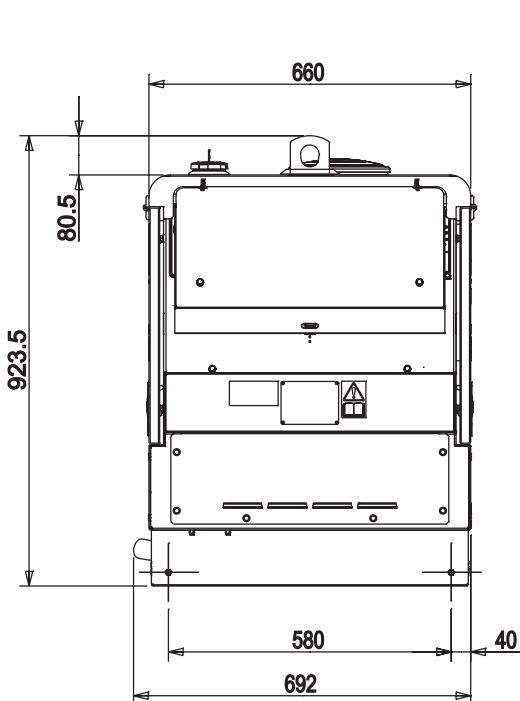
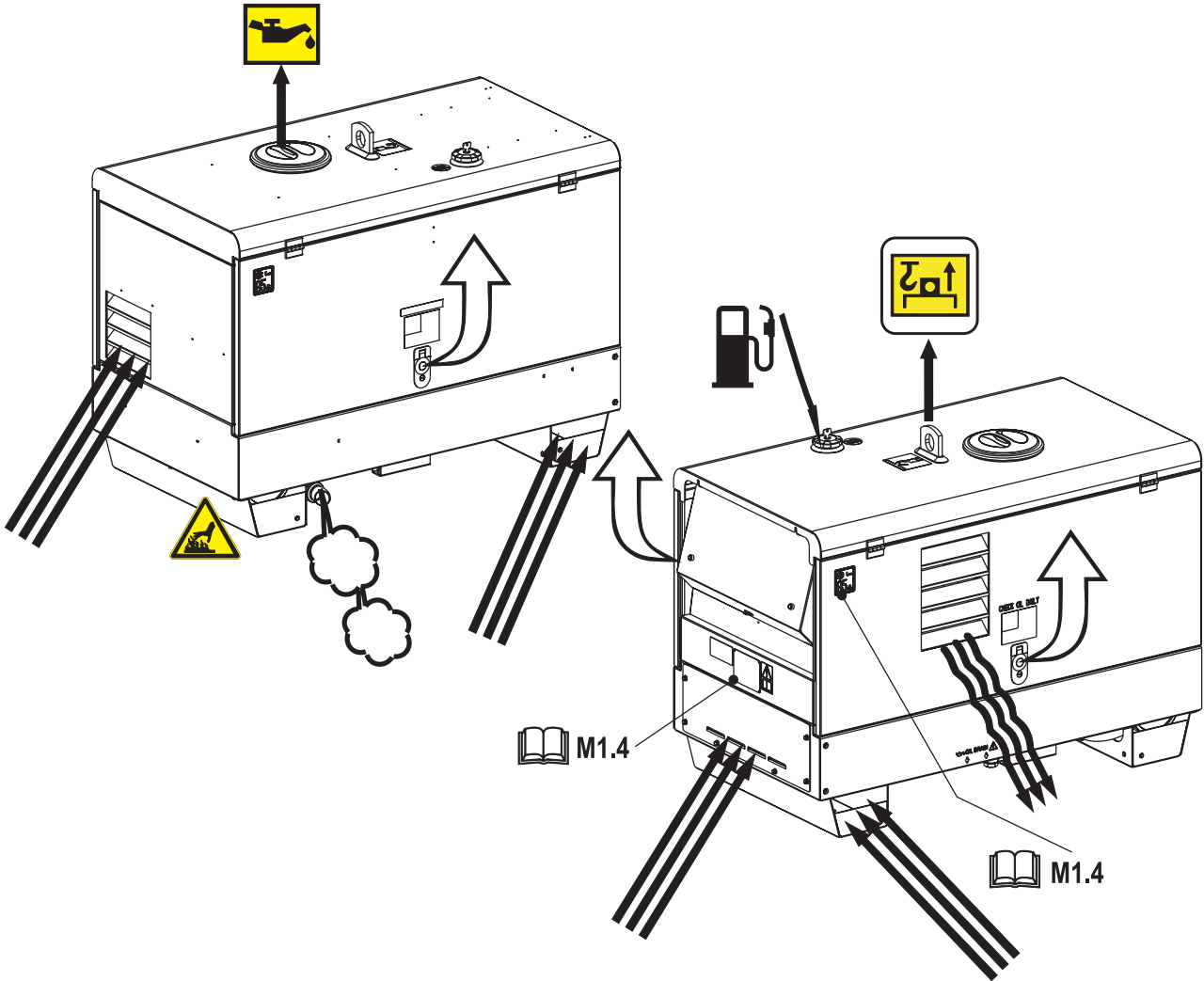


ATTENTION

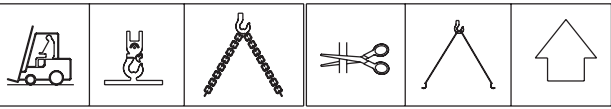


For a safer use from the operator **DO NOT** fit the machine in locations with high risk of flood.

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.

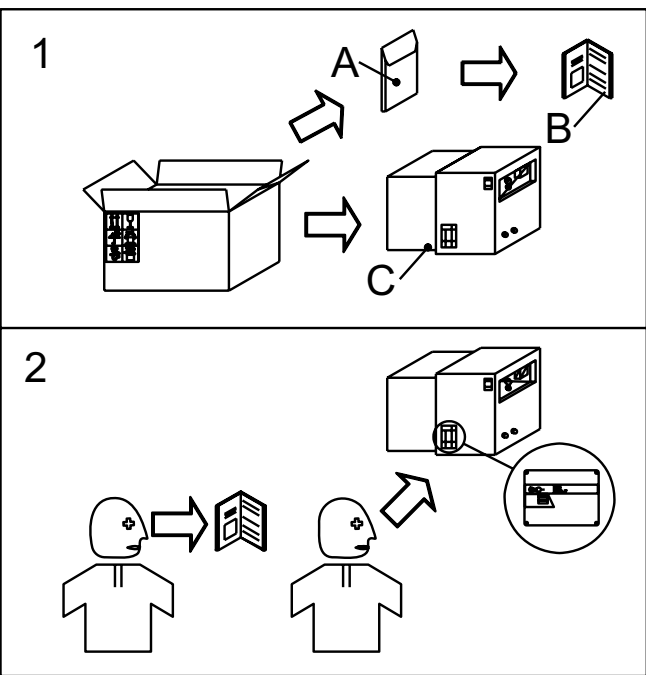
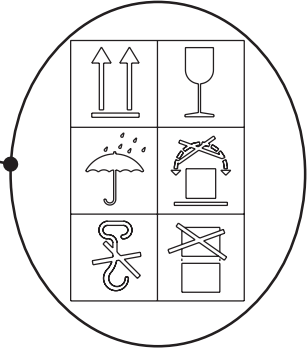
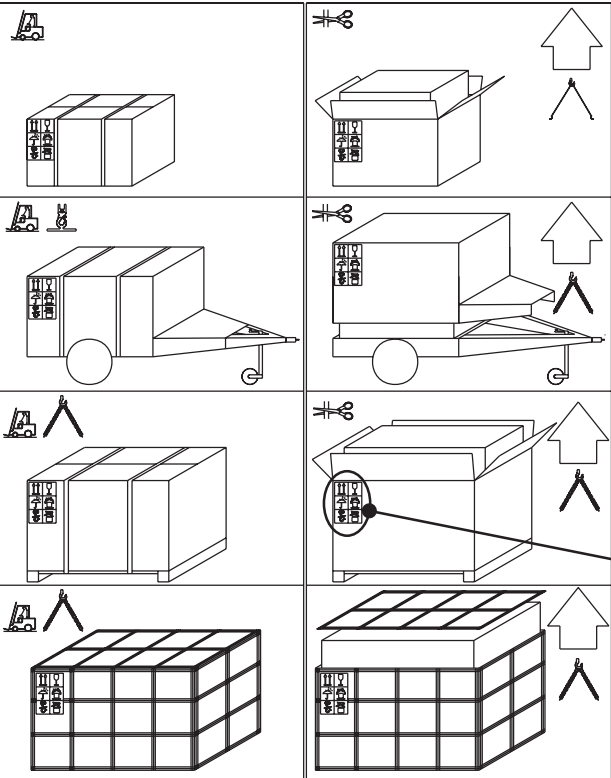


 **NOTE**



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.

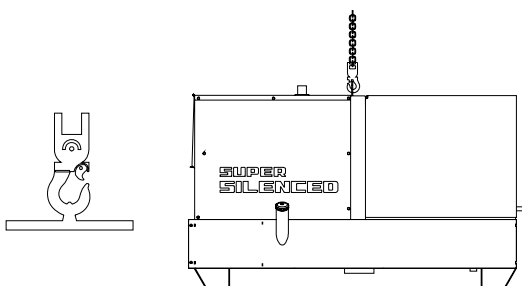
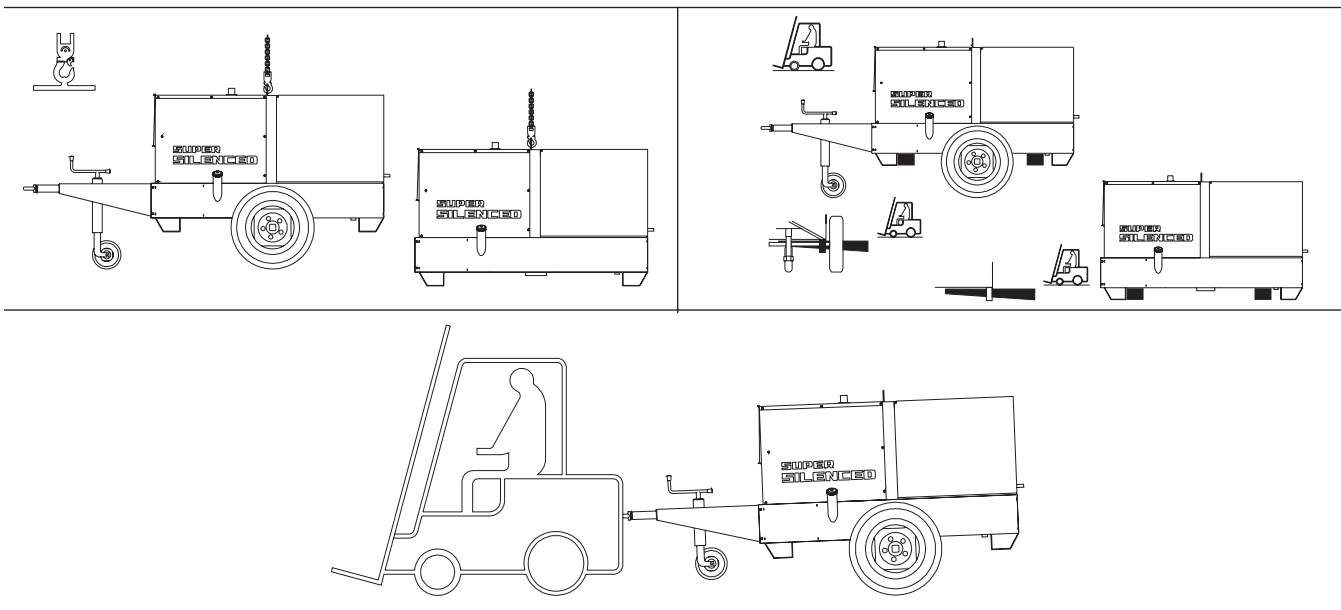
Be sure that the lifting devices are: correctly mounted, adequate for the weight of the machine with it's packaging, and conform to local rules and regulations.

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

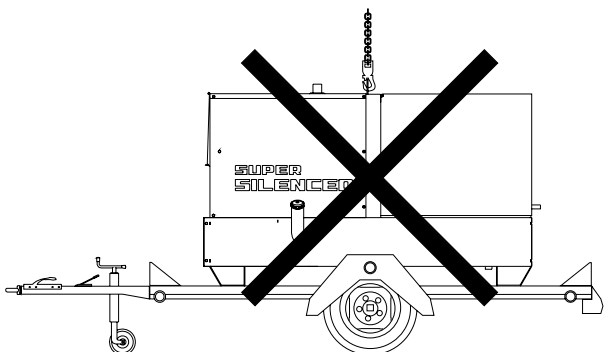
DO NOT LOAD OTHER PARTS WHICH CAN MODIFY WEIGHT AND BARICENTER POSITION.

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





NOTE

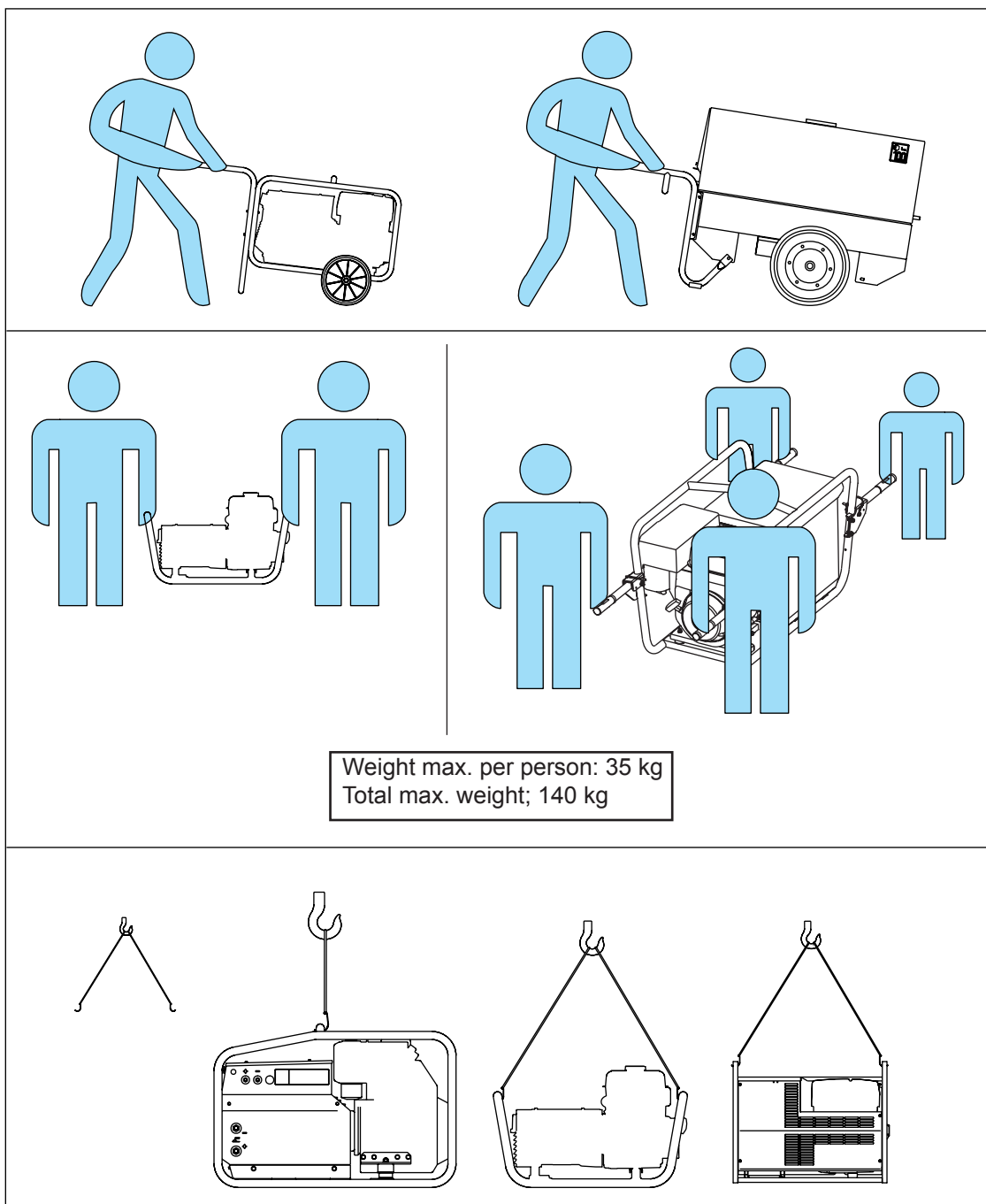
Transportation must always take place with the engine off, electrical cables and starting battery disconnected and fuel tank empty.

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

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

**DO NOT LOAD OTHER PARTS WHICH CAN MODIFY WEIGHT AND BARICENTER POSITION.
IT IS STRICTLY FORBIDDEN TO DRAG THE MACHINE MANUALLY OR TOW IT BY ANY VEHICLE (model with no CTM accessory).**

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



ATTENTION

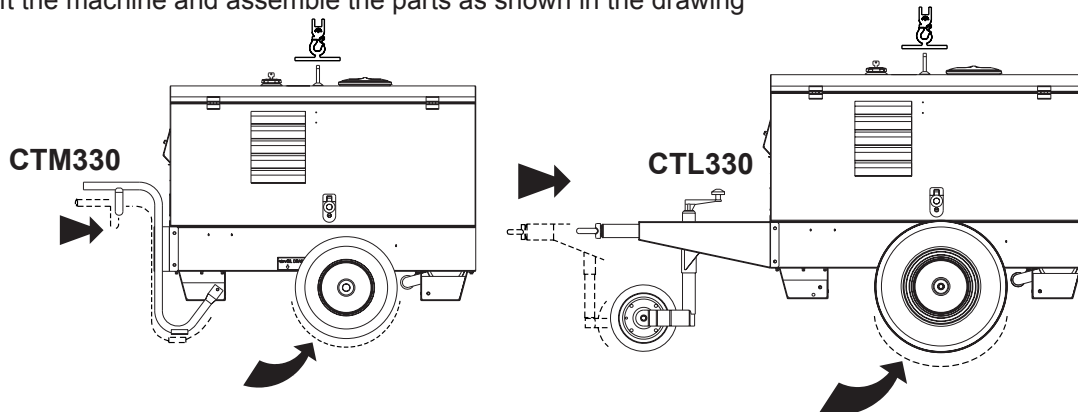
The CTL accessory cannot be removed from the machine and used separately (actioned manually or following vehicles) for the transport of loads or anyway for used different from the machine movements.

TRAILERS

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

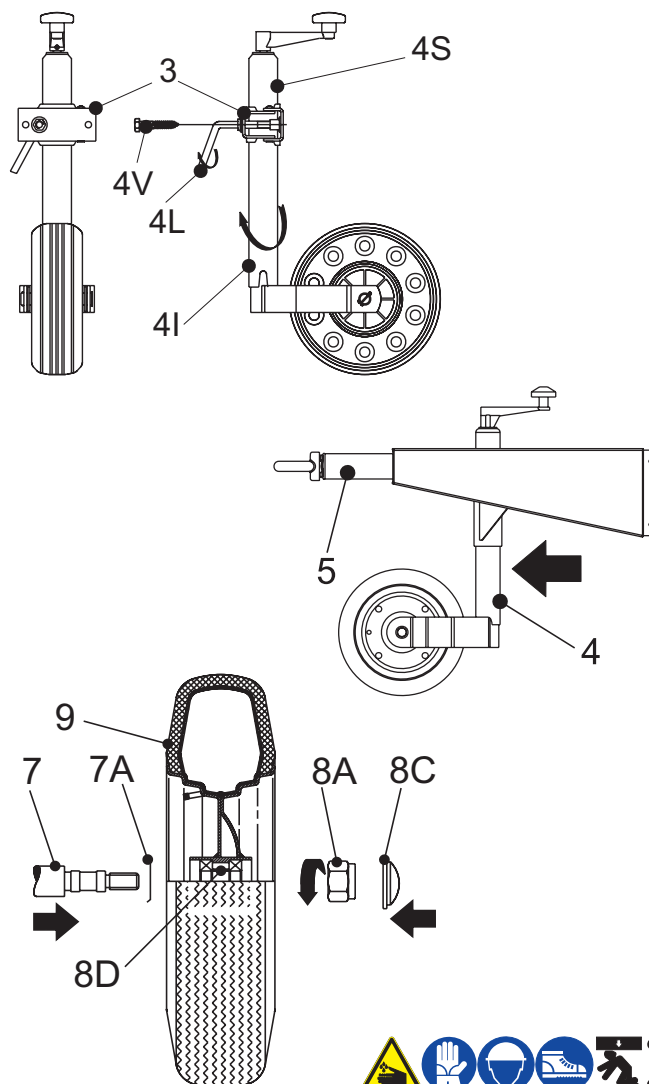
Towing on public roads or turnpikes of any type **IS EXCLUDED**, because **not** in possession of the requirements by national and foreign traffic norms.

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



For assembling the generating set on the trolley CTL330 please keep to following instructions:

- 1) - Lift the generating set (by means of suitable hook).
- 2) - Slightly fix the jaw (3) of the parking foot to the bar with the M10x20 screws, the M10 nuts and the washers (so as to let the foot sprag go through).
- 3) - Split (unscrewing them) the two parts of the foot (4S-4I) to be able later to assemble them on the jaw.
- 4) - Introduce into the jaw (3) the upper part (4S) of the foot and screw again the lower part (4I), then tighten the screws (4V) of the jaw to the towbar and block momentarily with the lever (4L) the whole foot.
- 5) - Assemble on the machine the towbar (5) complete of foot with the M10x20 screws, nuts and washers.
- 6) - Assemble the axle (7) to the base of the machine with the M8x20 screws and relative washers (two per part) so that their supports coincide.
- 7) - Introduce on the axle the antidust ring (7A) with folded edges turned toward the machine.
- 8) - Insert the wheel (9) on the axle paying attention to the spacer (8D) which is between the two bearings, then insert the self blocking nut (8A) and finally assemble the shutting cap (8C).
- 9) - Pump the tyre (9) bringing the pressure to three atms.
- 10) - Lower the machine to the ground and place the parking foot definitively (regulating at the best height).



ATTENTION

Do not substitute the original tires with other types.



BATTERY WITHOUT MAINTENANCE



The starter battery is supplied already charged and ready for use. Before starting the gen-set connect the cable + (positive) to the pole + of the battery, by properly tightening the clamp. In case of models with warning light: check the state of the battery by means of the indicator placed 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

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

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

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

REFUELLING AND CONTROL:

Carry out refuelling and controls with motor at level position.

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



ATTENTION

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



DRY AIR FILTER

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



OIL BATH AIR FILTER

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



FUEL



ATTENTION



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



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

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

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

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

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

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



GROUNDING CONNECTION

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

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

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





Check daily



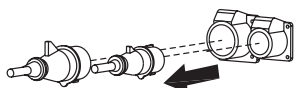
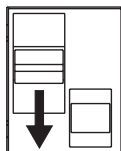
NOTE

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

ATTENTION

1. By start-up of the generator the welding circuit is immediately operative, i.e. under voltage. Make sure that there are no unwished electrical contacts between the components of the outside welding circuit (electrode, electrode holder gun, workpiece, etc...).

2. Check that at the start-up the a.c. auxiliary generation sockets do not feed any load. Open the electric protection interrupter of the generator or disconnect the plugs of the loads from the sockets.



3. START-UP

Remember that when the machines with auto-idle have the signal set to "auto-idle" will remain at the minimum no. of revs (tickover) as long as no current is drawn.

Drawing power will automatically raise the number of engine revs to the nominal value and likewise the tension in the alternator.

Instead, by setting the auto-idle signal to "max", the engine revs will immediately rise to the nominal value and likewise the tension in the alternator.

For the machines with manual accelerator, it is necessary to accelerate the motor manually in order to reach the nominal tension.

Starting is actuated using the key which is an integral part of the EP7 post on the front panel.

- A) - Turn the key in a clockwise direction until all the LED lights are illuminated.
- B) - Wait until the "OIL PRESSURE" and "BATTERY VOLTAGE" LEDs remain illuminated. If the timer lamp is used, the yellow "PREHEAT" LED comes on for the set time of the imposed settings.
- C) - As soon as the green "ENGINE RUNNING" LED starts to flash, actuate the key switch in a clockwise direction (momentarily in the position then with return to rest) until obtaining starting of the engine.

If the motor does not start within 15 seconds, the non starting alert will intervene: the two LEDs "Engine running" and "glow plug" will flash alternately (see motor protection description).

D) - At any time it is possible to stop the engine by turning the key in an anti-clockwise direction (OFF position).

In case of engine anomaly due to low oil pressure, high temperature, broken transmission belt, low fuel level or emergency the EP7 will automatically stop the engine.

4. The motor starts up at its operating speed, 3000 rpm. After start-up, allow the motor to run for a few minutes before powering on the utilities. See table;

Temperature	Time
≤ - 20° C	5 min.
da - 20° C a -10°C	2 min.
da - 10° C a -5°C	1 min.
≥ 5° C	20 sec.

5. start-up at low temperatures.

The motor will normally start up without problems down to temperatures of -10° C, -15° C. In case of starting difficulty, it is possible to repeat the starting preheating for a max. time of 10 second, lightly turning the trimmer situated at the back of the EP7 in a clockwise direction (see page M39.13 relating to engine protection "trimmer/glow plug"). For start-up and use at lower temperatures please see the engine manual or turn to our Technical Assistance Center.

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



CAUTION

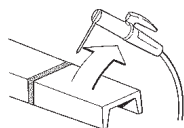
RUNNING-IN

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.

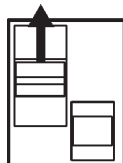
ARRESTO

Per un arresto in condizioni normali eseguire la seguente procedura:

1. Interrompere il processo saldatura in atto



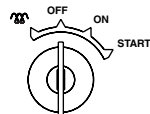
2. Interrompere l'erogazione di generazione ausiliaria c.a. sezionando i carichi oppure aprendo l'interruttore differenziale (D).



3. Lasciare girare il motore senza carico per alcuni minuti.

Portare al minimo il numero di giri del motore, deviatore giri motore su "autoidle" o acceleratore al minimo per le macchine con acceleratore manuale.

4. Ruotare la chiave di avviamento sull'EP7 in posizione OFF.



ARRESTO D'EMERGENZA

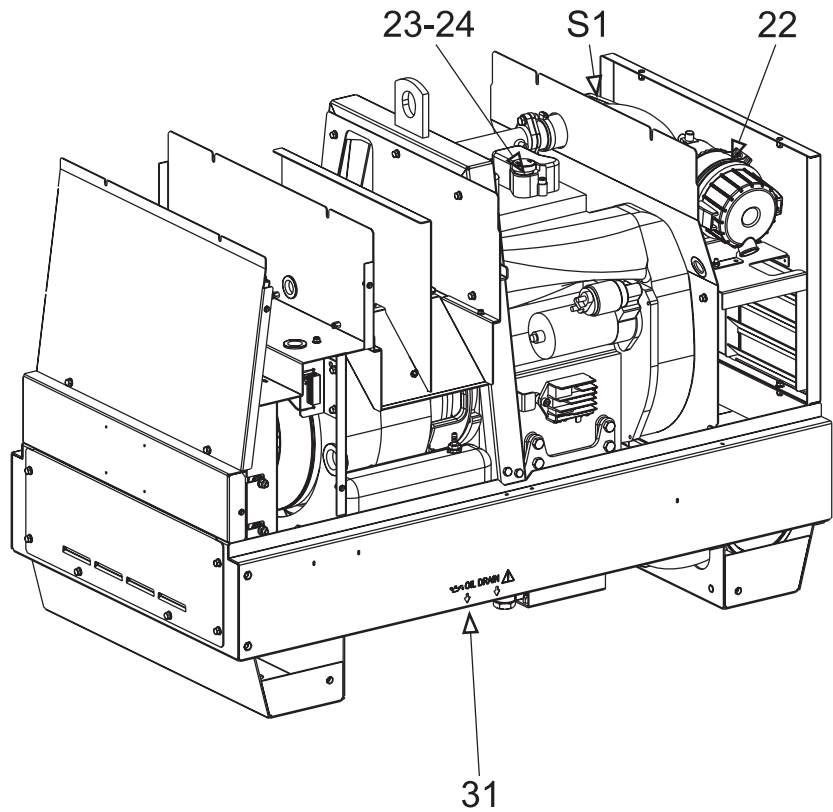
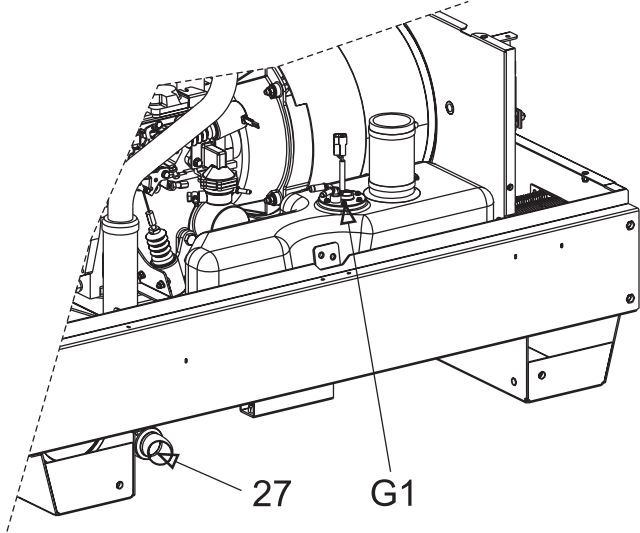
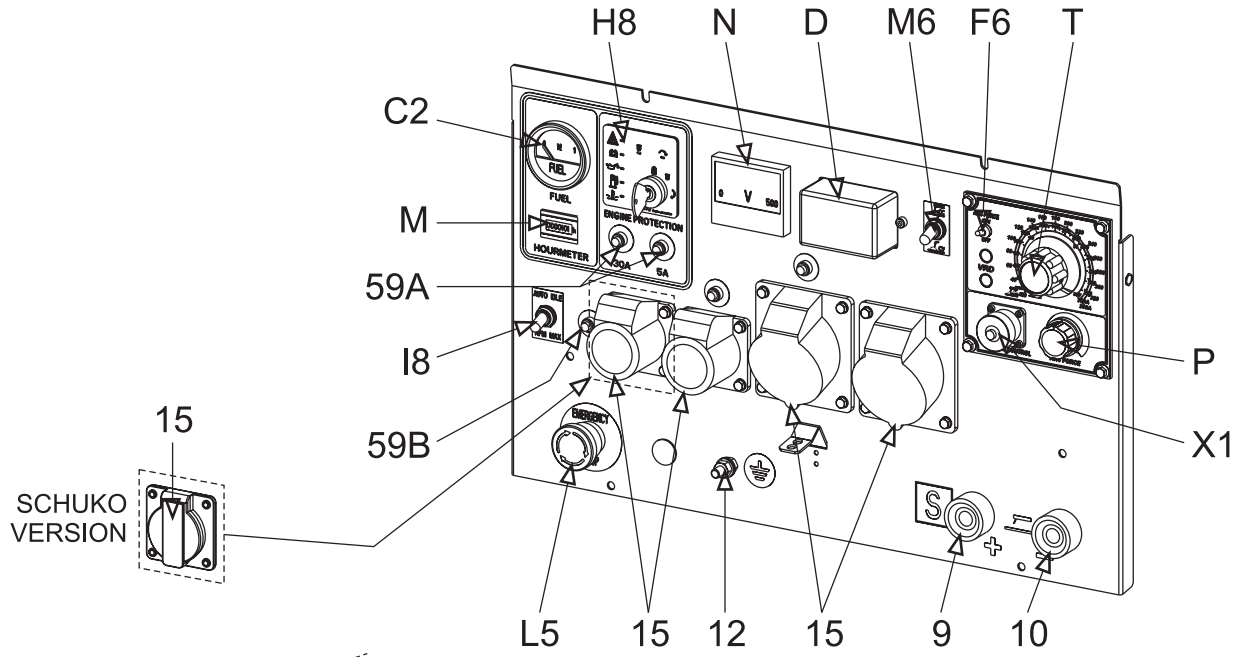
Per un arresto in condizioni di emergenza premere il pulsante d'emergenza (L5) (o ruotare la chiave in posizione OFF). Per il ripristino del pulsante ruotarlo in senso orario.

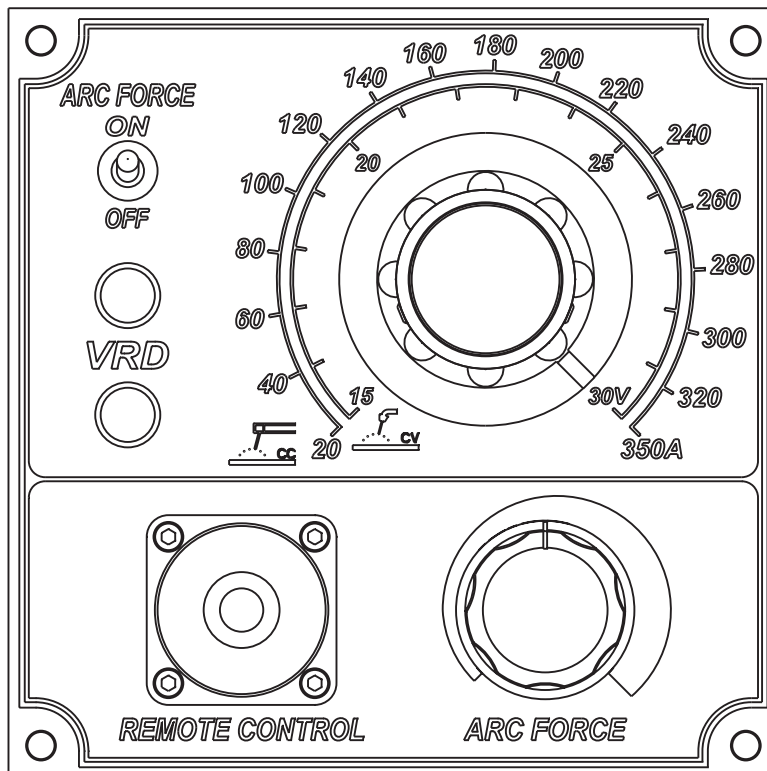
4A	Hydraulic oil level light	B4	Exclusion indicating light PTO HI	W3	Selection push button 30 I/1' PTO HI
9	Welding socket (+)	B5	Auxiliary current push button	W5	Battery voltmeter
10	Welding socket (-)	C2	Fuel level light	X1	Remote control socket
12	Earth terminal	C3	E.A.S. PCB	Y3	Button indicating light 20 I/1' PTO HI
15	A.C. socket	C6	Control unit for generating sets QEA	Y5	Commutator/switch, serial/parallel
16	Accelerator lever	D	Ground fault interrupter (30 mA)	Z2	Thermal-magnetic circuit breaker
17	Feed pump	D1	Engine control unit and economiser EP1	Z3	Selection push button 20 I/1' PTO HI
19	48V D.C. socket			Z5	Water temperature indicator
22	Engine air filter	D2	Ammeter		
23	Oil level dipstick	E2	Frequency meter		
24	Engine oil reservoir cap	E6	Frequency rpm regulator		
24A	Hydraulic oil reservoir cap	E7	Voltmeter regulator		
24B	Water filling cap	F	Fuse		
25	Fuel prefilter	F3	Stop switch		
26	Fuel tank cap	F5	Warning light, high temperature		
27	Muffler	F6	Arc-Force selector		
28	Stop control	G1	Fuel level transmitter		
29	Engine protection cover	H2	Voltage commutator		
30	Engine cooling/alternator fan belt	H6	Fuel electro pump		
31	Oil drain tap	H8	Engine control unit EP7		
31A	Hydraulic oil drain tap	I2	48V A.C. socket		
31B	Water drain tap	I3	Welding scale switch		
31C	Exhaust tap for tank fuel	I4	Preheating indicator		
32	Button	I5	Y/▲ switch		
33	Start button	I6	Start Local/Remote selector		
34	Booster socket 12V	I8	AUTOIDLE switch		
34A	Booster socket 24V	L	A.C. output indicator		
35	Battery charge fuse	L5	Emergency button		
36	Space for remote control	L6	Choke button		
37	Remote control	M	Hour counter		
42	Space for E.A.S.	M1	Warning level light		
42A	Space for PAC	M2	Contactora		
47	Fuel pump	M5	Engine control unit EP5		
49	Electric start socket	M6	CC/CV switch		
54	Reset button PTO HI	N	Voltmeter		
55	Quick coupling m. PTO HI	N1	Battery charge warning light		
55A	Quick coupling f. PTO HI	N2	Thermal-magnetic circuit breaker/ Ground fault interrupter		
56	Hydraulic oil filter				
59	Battery charger thermal switch	N5	Pre-heat push-button		
59A	Engine thermal switch	N6	Connector - wire feeder		
59B	Aux current thermal switch	O1	Oil pressure warning light/Oil alert		
59C	Supply thermal switch wire feeder-42V	O8	V/A digital instruments and led VRD PCB		
59D	Pre-heater (spark plug) thermal switch	P	Welding arc regulator		
59E	Supply thermal switch oil/water heater	P8	Water in fuel		
59F	Electropump thermal switch	Q1	Starter key		
63	No load voltage control	Q3	Derivation box		
66	Choke control	Q4	Battery charge sockets		
67A	Auxiliary / welding current control	Q7	Welding selector mode		
68	Cellulosic electrodes control	R3	Siren		
69A	Voltmeter relay	S	Welding ammeter		
70	Warning lights	S1	Battery		
71	Selecting knob	S3	Engine control unit EP4		
72	Load commut. push button	S6	Wire feeder supply switch		
73	Starting push button	S7	Plug 230V singlephase		
74	Operating mode selector	T	Welding current regulator		
75	Power on warning light	T4	Dirty air filter warning light/indicator		
76	Display	T5	Earth leakage relay		
79	Wire connection unit	T7	Analogic instrument V/Hz		
86	Selector	U	Current transformer		
86A	Setting confirmation	U3	R.P.M. adjuster		
87	Fuel valve	U4	Polarity inverter remote control		
88	Oil syringe	U5	Release coil		
A3	Insulation monitoring	U7	Engine control unit EP6		
A4	Button indicating light 30 I/1' PTO HI	V	Welding voltage voltmeter		
B2	Engine control unit EP2	V4	Polarity inverter control		
B3	E.A.S. connector	V5	Oil pressure indicator		
		W1	Remote control switch		

(I) Comandi
 (GB) Controls
 (F) Commandes

(D) Bedienelemente
 (E) Mandos
 (PT)

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 31
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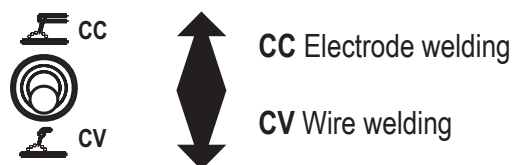
WELDING MODE SELECTION

The Welding Analogue Control unit (WAC) allows two possible control modes:

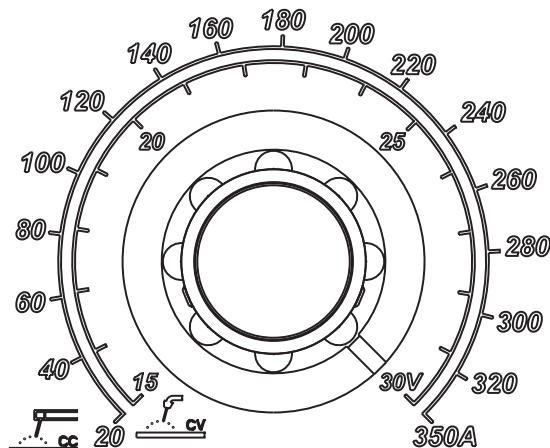
- Constant Current (CC)
- Constant Voltage (CV).

The welding option with C.V. characteristic is possible only on those models which support this mode of operation. On such models there is a switch on the front panel of the welder (outside the WAC unit), which allows to select the desired mode.

The regulation with C.C. characteristic can be used to weld with various types of electrodes. The regulation with C.V. characteristic is suitable for the wire welding, both naked and coated.



VOLTAGE AND CURRENT REGULATION



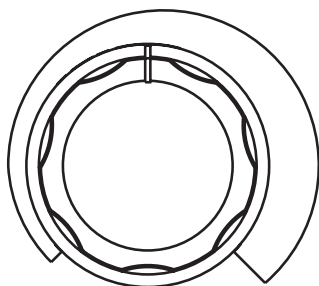
Current regulation

When the CC/CV switch is in CC position the main knob sets the welding current within a range from 20A to 350A.

Voltage regulation

With the CC/CV switch in CV position the main knob sets the welding voltage in a range between 15V and 30V.

ARC FORCE REGULATION



This type of regulation, possible only in CC mode, is accomplished by setting the position of the “arc force” switch and by adjusting the “arc force” knob. Both are located on the WAC panel.

For the welding processes which require a strictly constant current (e.g. TIG), the switch has to be placed in OFF position while the potentiometer position is irrelevant.

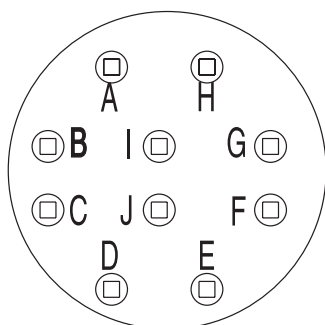
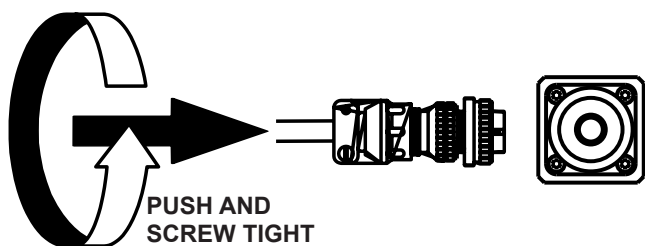
For the welding processes where a certain degree of arc force is suitable, the switch has to be positioned in ON and the potentiometer has to be properly adjusted, depending on the electrode type and the welding position.

REMOTE CONTROL

The WAC can accept the connection to a remote control box (optional) through a circular connector placed on the EAC panel.

After connection to a remote controller, the regulation function of the main knob is automatically switched to the knob on the remote controller.

The following table describes the pin function of the circular connector.



CONTACTS	DESCRIPTION
A (Ground)	To the RC1 potentiometer – GND terminal
B	To the RC1 potentiometer – V _{CONTR} terminal
C	To the RC1 potentiometer – V _{REF} terminal
D	Remote connection presence contact – wire bridge towards (C) cabling side
E	Non connected
F	Non connected
G	Welding enable contact in CV – enables when the contact is closed towards (I)
H	Negative pole of the welding voltage – to monitor the welding voltage by means of an instrument on the wire feeder
I	42Vac ±10% – phase A – for the power supply of the wire feeder
J	42Vac ±10% – phase B – for the power supply of the wire feeder

WIRE FEEDER

The welding control unit WAC is ready for connection to a wire feeder (optional), to be used in C.V. mode. The wire feeder can be supplied from a 42Vac ±10% source through the circular connector of the WAC. In this case, the same connector is used to interface the controller with a contact which enables the welding (conditioned by the torch trigger) and a remote potentiometer located on the wire feeder (where present).

In case of wire feeders directly supplied from the welding power, the operation is anyway possible. With this type of wire feeders there is no need for any connection to the circular connector of the WAC.

VRD FUNCTION (VRD = Voltage Reduction Device)

The VRD function (present only on some versions) fulfills the purpose of drastically reducing the harm which may result to a person from inadvertent contact with the electrode during non-welding pauses. The VRD automatically switches the control mode in CV and sets the voltage to a safe value (typically <13V) each time the welding process is interrupted for a period longer than 3 sec.



The VRD function is active only in CC mode.

VRD



The proper operation of the VRD protection (in the models where it is implemented) is monitored by a couple of LEDs: one green and one red. During welding the red LED indicates that a condition of electrical risk is present. When the welding is stopped for more than 3 sec. the green LED turns on (and the red LED turns off) indicating that the VRD function is active. This means that the voltage on the electrode has been lowered to a safe value.



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



ATTENTION

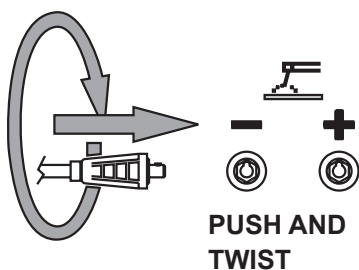
The areas, access of which is forbidden to unqualified personnel, are:

- the control switchboard (front) - the exhaust of the endothermic engine - the welding process.

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

Make sure that the ground connection (12) is efficient (when this connection is present, being necessary). See page M20.

Fully insert the welding cable plugs into the corresponding sockets turning them clockwise to lock them in position.



- ☞ Make sure that the ground clamp, whose cable must be connected to the + or - terminal, makes a good connection and is near to the welding position. Pay attention to the two polarities of the welding circuit, which must not come in electric contact between themselves



REMOTE CONTROL

See page M 38



ATTENTION

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

The welding operations must take place far from any sensitive electronic device. Make sure that the unit is earthed (see M20). In case the interference should last, adapt further disposition, such as: move the unit, use screened cables, line filters, screen the entire work area.

In case the above mentioned operations are non sufficient, please contact our Technical Assistance Service.



CAUTION

With a welding cable length up to 20 m is suggested a section of 35 mm²; with longer cables a bigger section is required.





WARNING

It is strictly forbidden to connect the group to the public mains and/or to any other source of electric power.

GENERATION IN AC (ALTERNATING CURRENT)

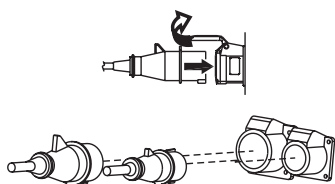
Make certain of the efficiency of the ground connection (12). - See page M20 -

Position the GFI switch to ON.

☞ Voltage is now immediately available to the AC sockets.

Verify that the voltmeter displays the nominal voltage value (at no load it is close to +10% of the nominal value).


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



☞ Verify that the electrical characteristics (voltage/frequency/power) of the device being powered are compatible with those of the generator.

Low frequency and/or voltage can irreparably damage some electrical devices.

Verify that the ground lead of the electrical appliance/tool to be powered is correctly connected to the terminal of the plug.

☞ For double insulation devices with the symbol , the plug's ground terminal does not need to be grounded.

THERMAL PROTECTION

The monophase outputs are protected against overloads by the thermal protection (59B).

When the rated current is exceeded, the protection intervenes to cut off the voltage to the AC socket.

☞ **Notes:** the intervention of the thermal protection is not instantaneous, but reacts according to an overcurrent/time characteristic, whereby the greater the overcurrent the quicker the intervention. In case of intervention by the protection device, verify that the total power for the loads connected does not exceed the declared rating and decrease if necessary. Disconnect the loads and wait a few



CIRCUIT BREAKER



minutes to allow the thermal protection to cool down.

Before resetting by pressing the central button and then

connect the load again.

If the protection should intervene again, replace it with another one with matching intervention current specifications and/or contact the Service Department.

☞ **Note:** do not forcibly hold the central button of the thermal protection device to prevent its intervention, as this could irreparably **damage** the unit's alternator.

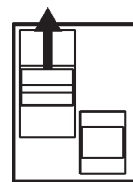
☞ **Note:** the three phase output does not require any protection against overcurrents, since it uses a self-protecting asynchronous type alternator.

GROUND FAULT INTERRUPTOR SWITCH

The high-sensitivity ground fault interruptor switch [G.F.I.] (30mA) (D), guarantees protection against indirect contacts due to faulty ground currents .

When the G.F.I. switch picks up a faulty ground current that is higher than 30mA, it intervenes by immediately cutting off voltage to the AC sockets.

In case of intervention by this protection device, reset the G.F.I. switch by moving the lever to the ON position. In case of another intervention, verify that there are no faults in the tools connected, or replace the G.F.I. switch with another one of matching specifications and/or contact the Service Department.



☞ **Notes:** Verify the operation of the G.F.I. switch at least once a month by pressing the TEST button. The generator must be running and the G.F.I. lever in the ON position.

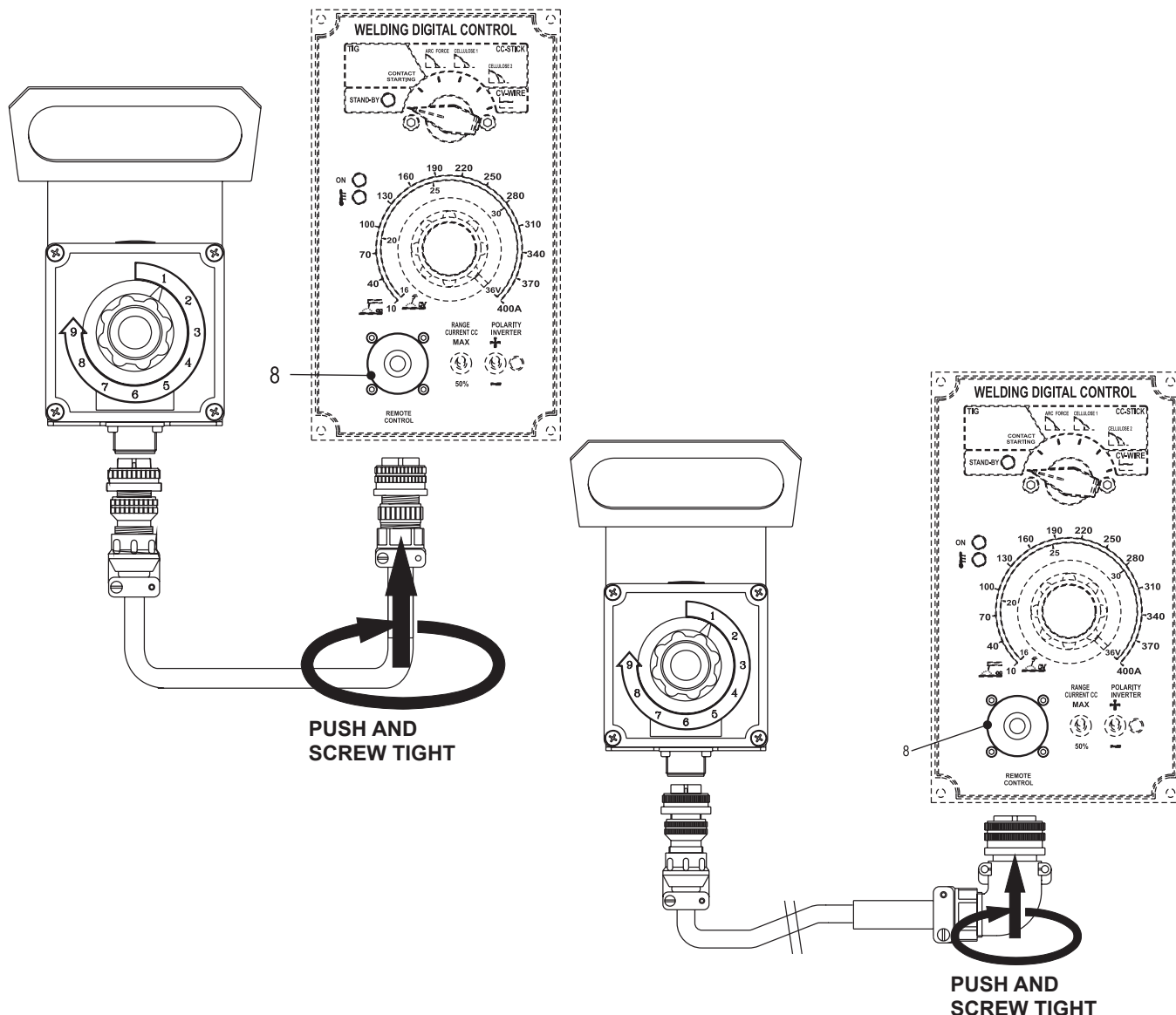
SIMULTANEOUS USE

The welder's alternator permits the simultaneous use of auxiliary power and welding current. The auxiliary power available to the AC plugs (15) diminishes as the welding current drawn increases.

The table on page M1.6 TECHNICAL SPECIFICATIONS shows the amount of auxiliary power available as the welding current varies.

COMBINED USE

The output available from the various auxiliary power sockets is limited, not only by the declared output of the unit but also by the capacity of each individual socket.



The remote control RC, which regulates the welding current in the CC (STICK welding) mode and the welding voltage in the CV (MIG/MAG welding), is connected to the front panel by means of a multipole connector.

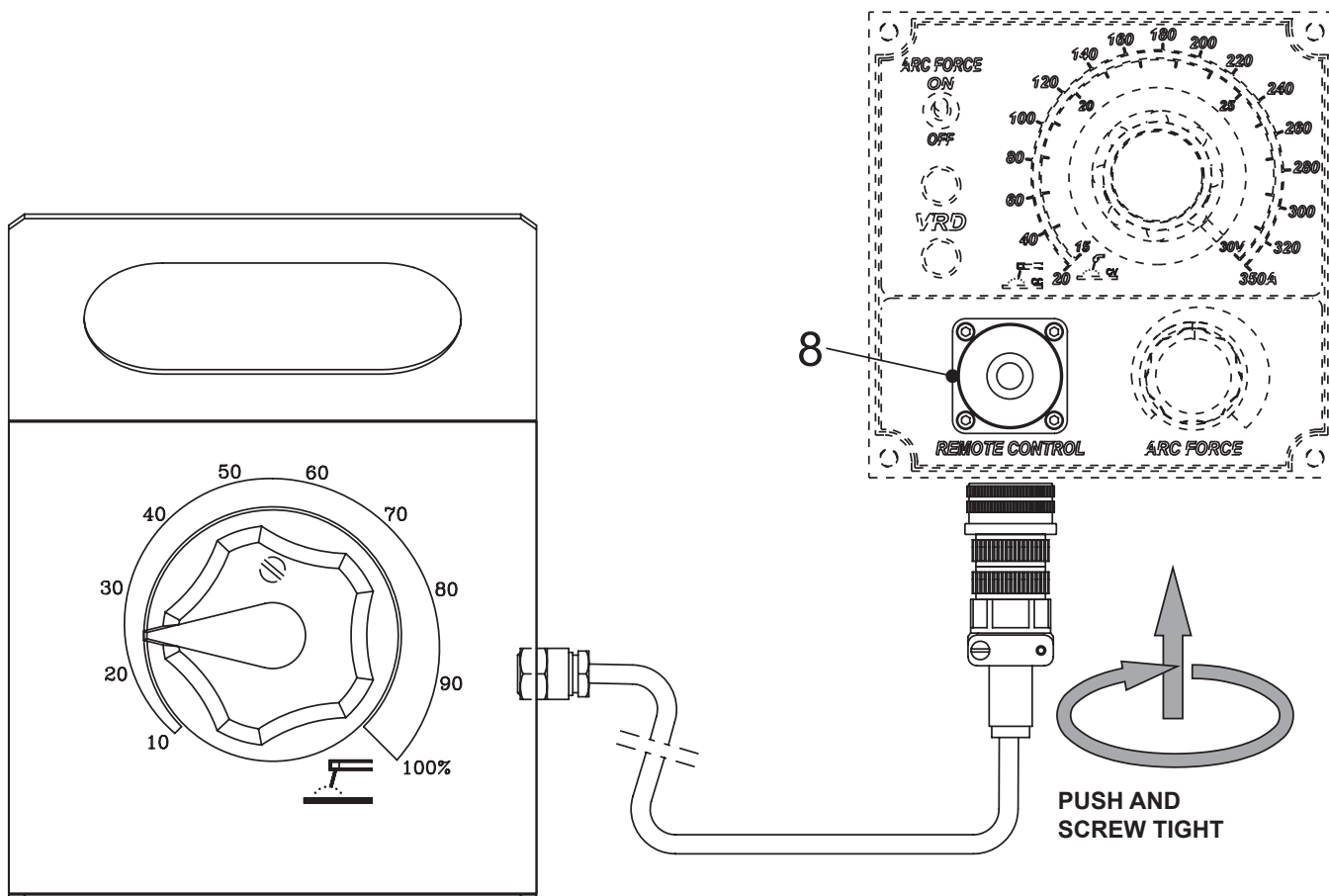
When the remote control is connected to the remote control connector (8), it is functional and automatically excludes the front panel regulation. The remote control can also be connected to the connector on the wire feeder front panel but in this case it is necessary to switch the wire feeder commutator so it can operate.

Adjust the welding current control knob to the correct current for the diameter and type of electrode being welded.



ATTENTION

When the RC is not used, it is necessary to disconnect the multipole connector



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

When the remote control is connected to the remote control connector (8), it is functional and automatically excludes the front panel regulation.

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

Description

The EP7 includes the basic safeguards to protect an DIESEL engine. The EP7 features 7 LEDs, 3 Static Outputs and a 30A Key Switch. The EP7 monitors an Oil Pressure-switch, Temperature-switch, Fuel Level-switch, Charger Alternator Voltage, and an Emergency-switch.

Specification

DC Supply, Battery Plant	8V up to 36 Vdc
Static Outputs (short circuit proof)	200 mAdc
Key Switch Rating	30 A (30 secs)/80 A (5 secs)
Dimensions-DIN 96 Size	72X72X55 (ex switch /key)
Weight	300 gr
Operating Temperature	-30° C /+70° C
Operating Humidity	96% (non-condensing)

[PREHEAT] yellow LED

This indicator illuminates during the Pre-Glow cycle (10 secs to 60 secs).

[EMERGENCY] red LED

This LED illuminates continuously when a shut down has been caused by the Emergency switch.

[ALTERNATOR FAILURE] red LED

This LED illuminates before engine starting or if a Belt Break shut down occurs (than 20 secs).

[OIL PRESSURE] red LED

This LED illuminates before engine starting or if an Oil Pressure shut down occurs.

[FUEL LEVEL] red LED

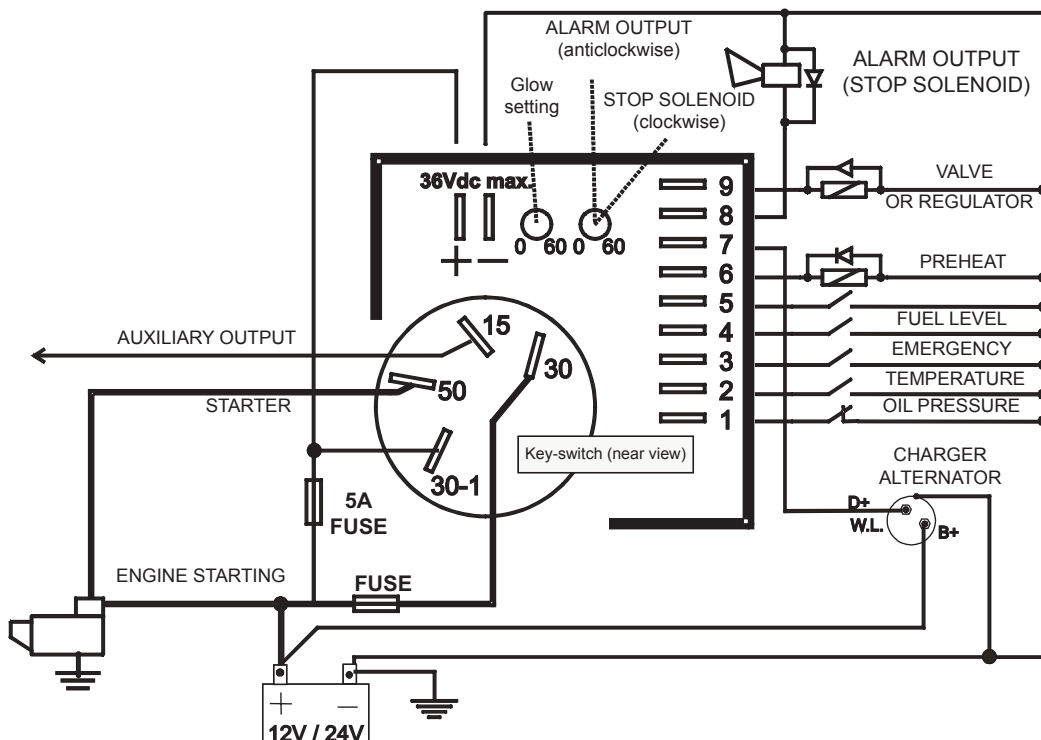
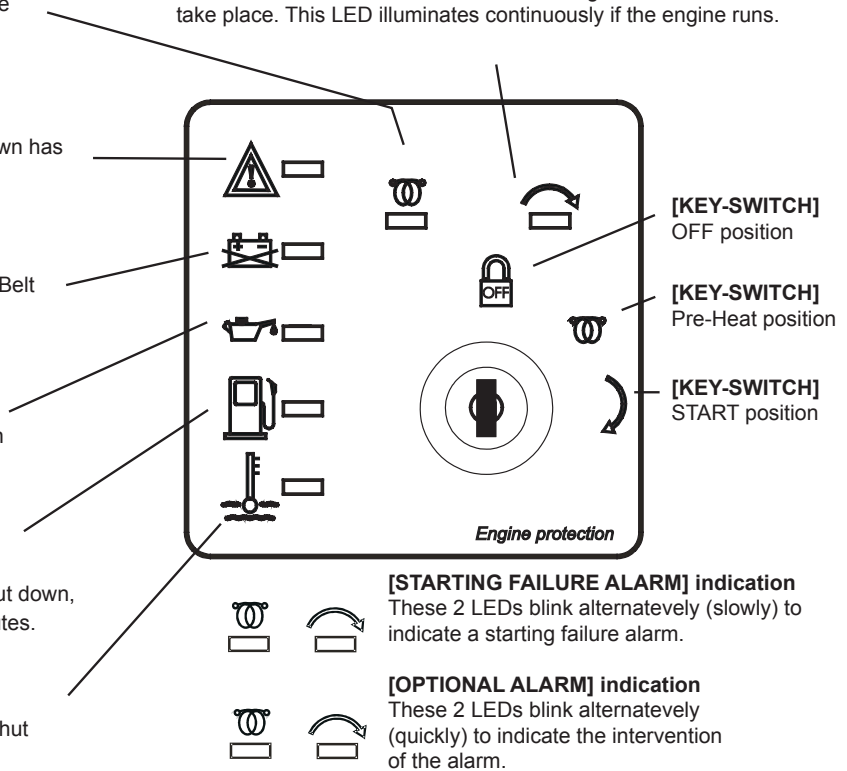
This LED blinks when a low fuel condition occurs. This LED illuminates continuously to indicate a shut down, if the switch has been closed for more than 5 minutes.

[TEMPERATURE] red LED

This LED illuminates when an High Temperature shut down occurs.

[ENGINE RUNNING] green LED

This LED blinks for 15 seconds, indicating that the EP7 is ready to start the engine (you have to turn the key to start). If the engine does not run within 15 seconds, the "Starting Failure" alarm will take place. This LED illuminates continuously if the engine runs.








PROBLEM	ASSOCIATED SYMPTOMS	POSSIBLE CAUSE	VERIFICATIONS	WHAT TO DO
P1 No welding arc (applicable only to machines with WAC)	No open circuit voltage	Failed power supply within the welding control board (WAC)	With the machine running, by means of a multimeter, check if there is a voltage of 5VDC \pm 0,125V between the contacts A (-) and C (+) on the circular connector of the WAC. In case of lack of voltage or condition not satisfied consider the suggested action.	Replace the welding control board of the WAC
P2 No welding arc (applicable only to machines without WAC)	No open circuit voltage	Failed power supply within the welding control board (WAC)	With the machine running, by means of a multimeter, check if there is a voltage of 5VDC \pm 0,125V between the contacts 1 (-) and 2 (+) on the circular connector of the front panel, after having set the remote control switch in ON position. In case of lack of voltage or condition not satisfied consider the suggested action.	Replace the welding control board
P3 No welding arc	No open circuit voltage	Failure in the control or drive circuits of the welding control board	In order to check the proper operation of these circuits it is necessary to use specific test and troubleshooting tools. Anyway, a visual inspection could be enough to localise possible damages caused by a failure. In case of evidence of damages consider the suggested action.	Replace the welding control board ATTENTION For the CS 230 only, there is a risk of failure propagation towards the chopper. Before replacing this board please check that the chopper works properly. If not replace both.
P4 Lack of welding current control	Full welding power (without current control) regardless of the knob position	Failure in the control or drive circuits of the welding control board	In order to check the proper operation of these circuits it is necessary to use specific test and troubleshooting tools. Anyway, a visual inspection could be enough to localise possible damages caused by a failure. In case of evidence of damages consider the suggested action.	Replace the welding control board ATTENTION For the CS 230 only, there is a risk of failure propagation towards the chopper. Before replacing this board please check that the chopper works properly. If not replace both.
P5 No welding arc	No open circuit voltage or welding available current low or negligible. With auto-idle installed, the r.p.m. never slows-down to idle.	Hall sensor failed	Disconnect the Hall sensor from the welding control board (on the WAC or within the electrical box, as applicable) and check that, in this condition, the open circuit voltage reading is correct. When the VRD is installed, the voltage goes to VRD value. If a resistive load bank is available, check that it is possible draw power (do not exceed 100A). If the Auto-idle is installed, in this condition the machine does not exit the idle. In any case, don't try to weld with the Hall sensor disconnected. If the test gives positive result, consider the indicated action.	Replace the Hall sensor



PROBLEM	ASSOCIATED SYMPTOMS	POSSIBLE CAUSE	VERIFICATIONS	WHAT TO DO
P6 Lack of voltage control in CV mode (applicable to the CC-CV machines provided with filter board)	The open circuit voltage in CV mode is the same as for the CC mode, regardless of the control knob position	Failure in the EMC filter board on the welding sockets	Check by means of a multimeter (stopped machine) the resistance value between positive welding socket and the corresponding faston connector on the filter board. The condition to check is: ohmic value between + welding socket and + board faston (the one to which the red cables are connected) < 4 ohm In case of condition not satisfied take the indicated corrective action.	Replace the EMC filter board
P7 No welding arc (applicable to the machines provided with the filter board on the welding sockets)	The open circuit voltage is zero	Failure in the EMC filter board on the welding sockets	Check by means of a multimeter (stopped machine) the resistance value between positive welding socket and the corresponding faston connector on the filter board. The condition to check is: ohmic value between - welding socket and - board faston (the one to which the black cables are connected) < 4 ohm In case of condition not satisfied take the indicated corrective action.	Replace the EMC filter board
P8 Minimum welding current in CC mode too high (applicable to the machines provided with the filter board on the welding sockets)	The welding current in CC mode with the knob at beginning of scale is too high and changes when turning the arc force knob (if present, switch in ON position)	Failure in the EMC filter board on the welding sockets	Check by means of a multimeter (stopped machine) the resistance value between positive welding socket and the corresponding faston connector on the filter board. The condition to check is: ohmic value between + welding socket and + board faston (the one to which the red cables are connected) < 4 ohm In case of condition not satisfied take the indicated corrective action.	Replace the EMC filter board
P9 Minimum welding current in CC mode too high	The welding current in CC mode with the knob at beginning of scale is too high and changes when turning the arc force knob (if present, switch in ON position)	Cable interruption between the WAC or the welding control board (as applicable depending on the machine type) and the welding sockets	With the machine stopped, extract the connector plugged to J1 of the WAC / Welding control board (as applicable depending on the machine type). Check by means of a multimeter the continuity between pin 6 of the connector and the positive welding socket. The resistive value shall be < 4 ohm if there is a filter board behind the sockets, otherwise shall be < 0.5 ohm. In case of condition not satisfied take the indicated corrective action.	Fix the cabling or replace it.
P10 No welding arc	The open circuit voltage is zero	Cable interruption between the WAC or the welding control board (as applicable depending on the machine type) and the welding sockets	With the machine stopped, extract the connector plugged to J1 of the WAC / Welding control board (as applicable depending on the machine type). Check by means of a multimeter the continuity between pin 5 of the connector and the negative welding socket. The resistive value shall be < 4 ohm if there is a filter board behind the sockets, otherwise shall be < 0.5 ohm. In case of condition not satisfied take the indicated corrective action	Fix the cabling or replace it.



PROBLEM	ASSOCIATED SYMPTOMS	POSSIBLE CAUSE	VERIFICATIONS	WHAT TO DO
P11 Lack of welding current control	Full welding power (without current control) regardless of the knob position. When the auto-idle is installed, the machine remains at low r.p.m.	Hall sensor failed	In order to check the proper operation of the Hall sensor it is necessary to use specific test and troubleshooting tools. Anyway, a visual inspection could be enough to localise possible damages, with particular reference to possible wear of the cable end coming out of the Hall sensor potting. Please check also the connector contacts crimping at the opposite end of the cable. In case of evidence of damages consider the suggested action	Replace the Hall sensor
P12 Lack of welding current control (applicable only to CS 350)	Full welding power (without current control) regardless of the knob position	Chopper and/or driver board failed	Disconnect the chopper cable from the connector J3 of the WAC. Check that the open circuit voltage is < 1V. If not put a light resistive load at the welding output (few kohms are enough) and check again the previous condition. If it is not satisfied the chopper is faulty. If a welding load bank and a clamp DC amp meter are available, another test can be done to localise the failed section/s. To this purpose set the load bank for a current of a few tens of amps and measure the current at the output of each chopper section (the group of cables which connect the chopper to one end of the welding current leveling reactor). The sections through which the current flows are failed or improperly driven by the driver board. If the test confirms this type of failure consider the suggested corrective action.	Replace the chopper and the driver board
P13 Lack of welding current control (applicable only to CS 230)	Full welding power (without current control) regardless of the knob position	Chopper faulty	Disconnect the chopper cable from the connector J3 of the WAC. Check that the open circuit voltage is < 1V. If not put a light resistive load at the welding output (few kohms are enough) and check again the previous condition. If it is not satisfied the chopper is faulty. In this case consider the suggested corrective action.	Replace the chopper
P14 Knob irregular or missing current adjustment	When turning the knob the current setting (and the voltage setting, if applicable) do not change or change irregularly	The potentiometer which regulates the welding current (and the welding voltage, when applicable) is faulty	Check if the regulation through remote control works properly. If confirmed, consider the suggested corrective action.	Replace the potentiometer

 WARNING		
	<ul style="list-style-type: none"> • Have qualified personnel do maintenance and troubleshooting work. • Stop the engine before doing any work inside the machine. If for any reason the machine must be operated while working inside, pay attention moving parts, hot parts (exhaust manifold and muffler, etc.) electrical parts which may be unprotected when the machine is open. • Remove guards only when necessary to perform maintenance, and replace them when the maintenance requiring their removal is complete. • Please wear the appropriate clothing and make use of the PPE (Personal Protective Equipment), according to the type of intervention (protective gloves, insulated gloves, glasses). • Do not modify the components if not authorized. <p style="text-align: center;">- See pag. M1.1 -</p>	
MOVING PARTS can injure		HOT surface can hurt you

NOTE

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

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

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

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


 IMPORTANT
 <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



 NOTE
<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>

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

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

GASOLINE ENGINE

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

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

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

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

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

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

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

DIESEL ENGINE



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

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

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

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

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

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

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

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

This, of course, after authorization.

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

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

RUTILE ELECTRODES: E 6013

Easily removable fluid slag, suitable for welding in all position. Rutile electrodes weld in d.c. with both polarities (electrode holder at + or -) and in a.c.. Suitable for soft steels R-38/45 kg/mm². Also for soft steels of lower quality.

BASIC ELECTRODES: E 7015

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

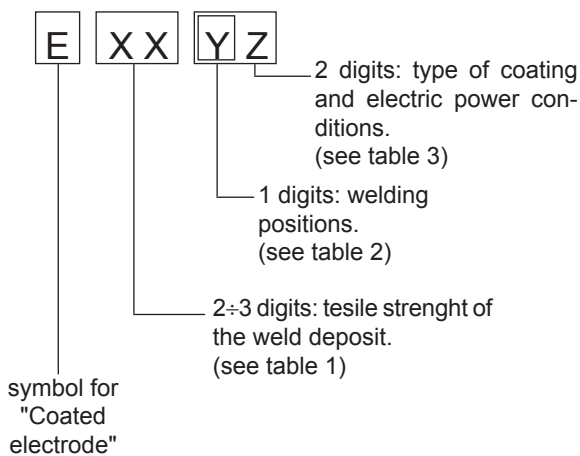
HIGH YIELD BASIC ELECTRODES: E 7018

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

CELLULOSIC ELECTRODES: E 6010

Cellulosic electrodes weld only in d.c. with polarity + electrode holder - ground clamp. Special for steels run on pipes with R max 55 kg/mm². Weld in all position. volatile slag.

ELECTRODES IDENTIFICATION ACCORDING TO A.W.S. STANDARDS



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

Table 1

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

Table 2

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

Table 3

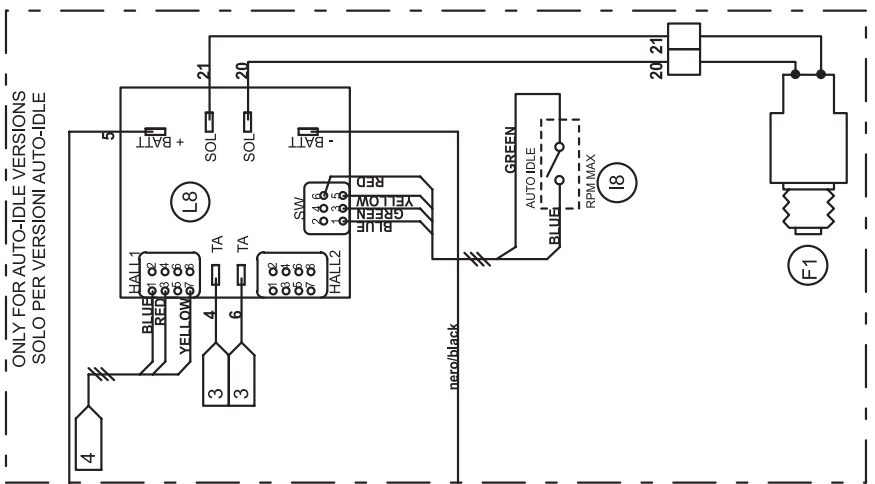
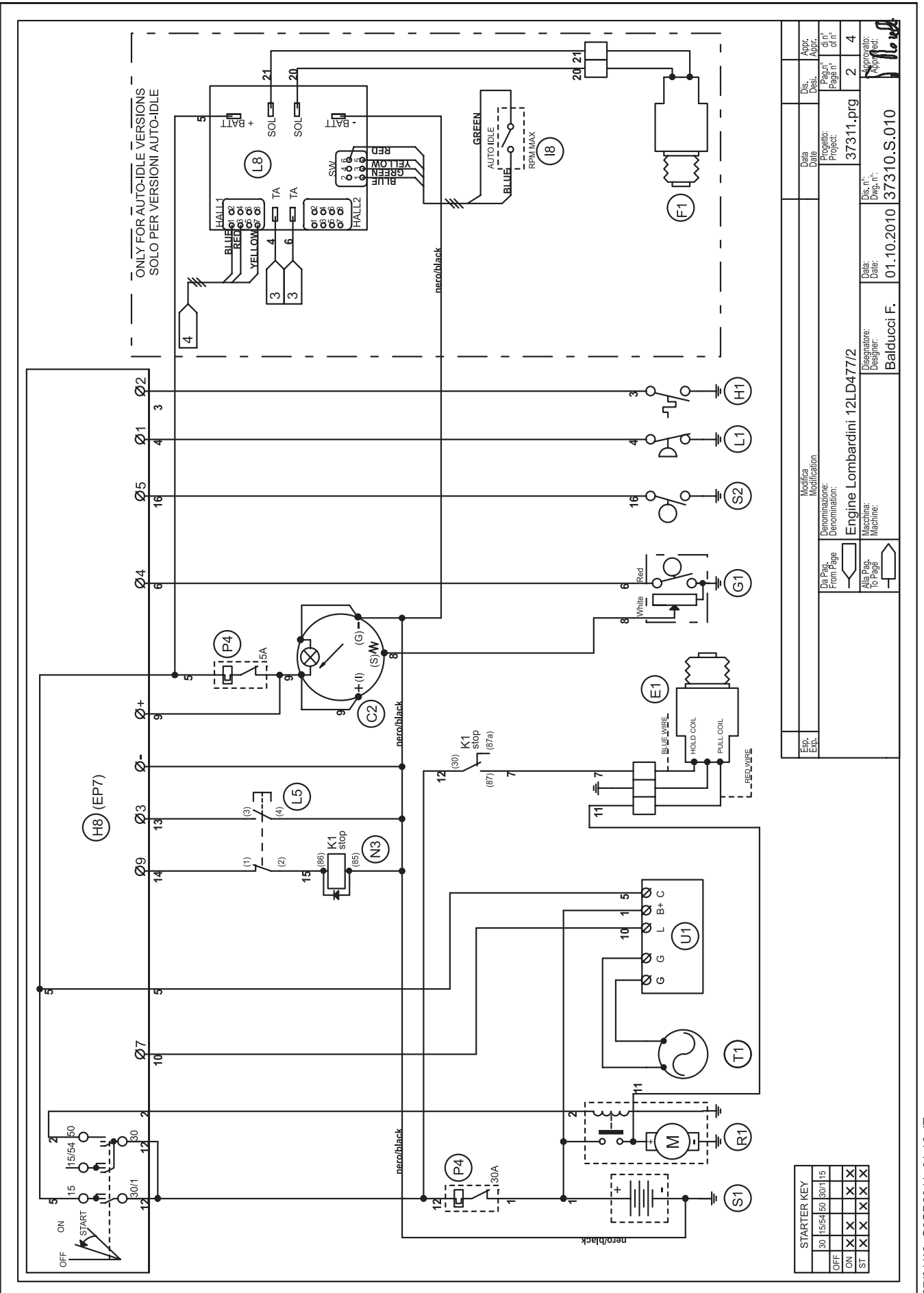


ELECTRICAL SYSTEM LEGENDE

M
60

REV.11-06/14

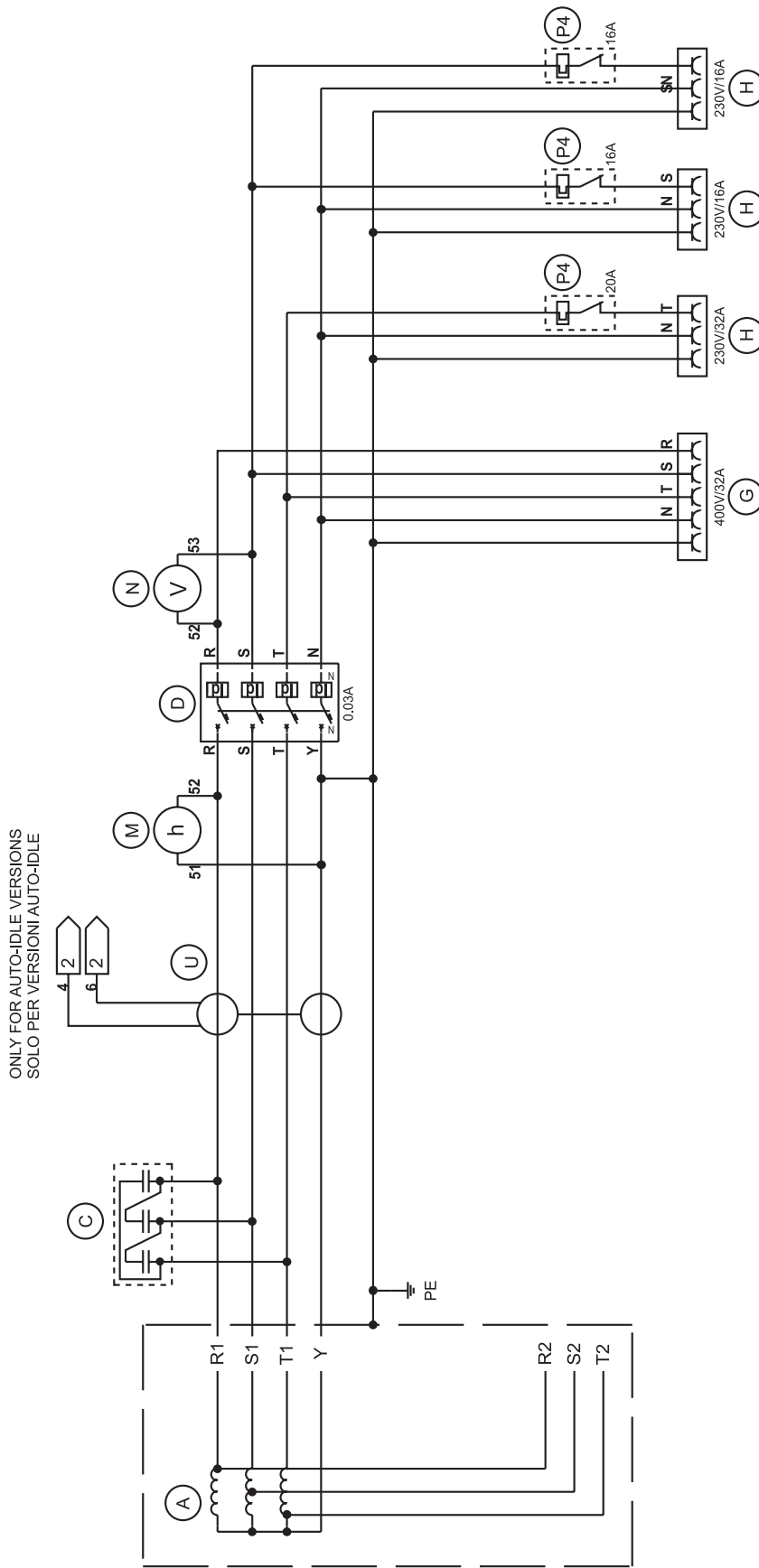
A : Alternator	E3 : Open circuit voltage switch	I6 : Start Local/Remote selector	N9 : UP/DOWN button mast
B : Wire connection unit	F3 : Stop push-button	L6 : Choke button	O9 : Hydraulic unit solenoid valve
C : Capacitor	G3 : Ignition coil	M6 : Switch CC/CV	P9 : Hydraulic unit engine
D : G.F.I.	H3 : Spark plug	N6 : Connector – wire feeder	Q9 : Ignitor
E : Welding PCB transformer	I3 : Range switch	O6 : 420V/110V 3-phase transformer	R9 : Lamp
F : Fuse	L3 : Oil shut-down button	P6 : Switch IDLE/RUN	S9 : Power system
G : 400V 3-phase socket	M3 : Battery charge diode	Q6 : Hz/V/A analogic instrument	T9 : 48Vdc power system
H : 230V 1phase socket	N3 : Relay	R6 : EMC filter	U9 : LED projector
I : 110V 1-phase socket	O3 : Resistor	S6 : Wire feeder supply switch	V9 : 125/250V 1phase socket
L : Socket warning light	P3 : Sparkler reactor	T6 : Wire feeder socket	Z9 :
M : Hour-counter	Q3 : Output power unit	U6 : DSP chopper PCB	W9 :
N : Voltmeter	R3 : Electric siren	V6 : Power chopper supply PCB	X9 :
P : Welding arc regulator	S3 : E.P.4 engine protection	Z6 : Switch and leds PCB	Y9 :
Q : 230V 3-phase socket	T3 : Engine control PCB	W6 : Hall sensor	
R : Welding control PCB	U3 : R.P.M. electronic regulator	X6 : Water heater indicator	
S : Welding current ammeter	V3 : PTO HI control PCB	Y6 : Battery charge indicator	
T : Welding current regulator	Z3 : PTO HI 20 l/min push-button	A7 : Transfer pump selector AUT-0-MAN	
U : Current transformer	W3 : PTO HI 30 l/min push-button	B7 : Fuel transfer pump	
V : Welding voltage voltmeter	X3 : PTO HI reset push-button	C7 : "GECO" generating set test	
Z : Welding sockets	Y3 : PTO HI 20 l/min indicator	D7 : Flooting with level switches	
X : Shunt	A4 : PTO HI 30 l/min indicator	E7 : Voltmeter regulator	
W : D.C. inductor	B4 : PTO HI reset indicator	F7 : WELD/AUX switch	
Y : Welding diode bridge	C4 : PTO HI 20 l/min solenoid valve	G7 : Reactor, 3-phase	
A1 : Arc striking resistor	D4 : PTO HI 30 l/min solenoid valve	H7 : Switch disconnecter	
B1 : Arc striking circuit	E4 : Hydraulic oil pressure switch	I7 : Solenoid stop timer	
C1 : 110V D.C./48V D.C. diode bridge	F4 : Hydraulic oil level gauge	L7 : "VODIA" connector	
D1 : E.P.1 engine protection	G4 : Preheating glow plugs	M7 : "F" EDC4 connector	
E1 : Engine stop solenoid	H4 : Preheating gearbox	N7 : OFF-ON-DIAGN. selector	
F1 : Acceleration solenoid	I4 : Preheating indicator	O7 : DIAGNOSTIC push-button	
G1 : Fuel level transmitter	L4 : R.C. filter	P7 : DIAGNOSTIC indicator	
H1 : Oil or water thermostat	M4 : Heater with thermostat	Q7 : Welding selector mode	
I1 : 48V D.C. socket	N4 : Choke solenoid	R7 : VRD load	
L1 : Oil pressure switch	O4 : Step relay	S7 : 230V 1-phase plug	
M1 : Fuel warning light	P4 : Circuit breaker	T7 : V/Hz analogic instrument	
N1 : Battery charge warning light	Q4 : Battery charge sockets	U7 : Engine protection EP6	
O1 : Oil pressure warning light	R4 : Sensor, cooling liquid temperature	V7 : G.F.I. relay supply switch	
P1 : Fuse	S4 : Sensor, air filter clogging	Z7 : Radio remote control receiver	
Q1 : Starter key	T4 : Warning light, air filter clogging	W7 : Radio remote control transmitter	
R1 : Starter motor	U4 : Polarity inverter remote control	X7 : Isometer test push-button	
S1 : Battery	V4 : Polarity inverter switch	Y7 : Remote start socket	
T1 : Battery charge alternator	Z4 : Transformer 230/48V	A8 : Transfer fuel pump control	
U1 : Battery charge voltage regulator	W4 : Diode bridge, polarity change	B8 : Ammeter selector switch	
V1 : Solenoid valve control PCB	X4 : Base current diode bridge	C8 : 400V/230V/115V commutator	
Z1 : Solenoid valve	Y4 : PCB control unit, polarity inverter	D8 : 50/60 Hz switch	
W1 : Remote control switch	A5 : Base current switch	E8 : Cold start advance with temp. switch	
X1 : Remote control and/or wire feeder socket	B5 : Auxiliary push-button ON/OFF	F8 : START/STOP switch	
Y1 : Remote control plug	C5 : Accelerator electronic control	G8 : Polarity inverter two way switch	
A2 : Remote control welding regulator	D5 : Actuator	H8 : Engine protection EP7	
B2 : E.P.2 engine protection	E5 : Pick-up	I8 : AUTOIDLE switch	
C2 : Fuel level gauge	F5 : Warning light, high temperature	L8 : AUTOIDLE PCB	
D2 : Ammeter	G5 : Commutator auxiliary power	M8 : A4E2 ECM engine PCB	
E2 : Frequency meter	H5 : 24V diode bridge	N8 : Remote emergency stop connector	
F2 : Battery charge transformer	I5 : Y/▲ commutator	O8 : V/A digital instruments and led VRD PCB	
G2 : Battery charge PCB	L5 : Emergency stop button	P8 : Water in fuel	
H2 : Voltage selector switch	M5 : Engine protection EP5	Q8 : Battery disconnect switch	
I2 : 48V a.c. socket	N5 : Pre-heat push-button	R8 : Inverter	
L2 : Thermal relay	O5 : Accelerator solenoid PCB	S8 : Overload led	
M2 : Contactor	P5 : Oil pressure switch	T8 : Main IT/TN selector	
N2 : G.F.I. and circuit breaker	Q5 : Water temperature switch	U8 : NATO socket 12V	
O2 : 42V EEC socket	R5 : Water heater	V8 : Diesel pressure switch	
P2 : G.F.I. resistor	S5 : Engine connector 24 poles	Z8 : Remote control PCB	
Q2 : T.E.P. engine protection	T5 : Electronic GFI relais	W8 : Pressure turbo protection	
R2 : Solenoid control PCB	U5 : Release coil, circuit breaker	X8 : Water in fuel sender	
S2 : Oil level transmitter	V5 : Oil pressure indicator	Y8 : EDC7-UC31 engine PCB	
T2 : Engine stop push-button T.C.1	Z5 : Water temperature indicator	A9 : Low water level sender	
U2 : Engine start push-button T.C.1	W5 : Battery voltmeter	B9 : Interface card	
V2 : 24V c.a. socket	X5 : Contactor, polarity change	C9 : Limit switch	
Z2 : Thermal magnetic circuit breaker	Y5 : Commutator/switch, series/parallel	D9 : Starter timing card	
W2 : S.C.R. protection unit	A6 : Commutator/switch	E9 : Luquid pouring level float	
X2 : Remote control socket	B6 : Key switch, on/off	F9 : Under voltage coil	
Y2 : Remote control plug	C6 : QEA control unit	G9 : Low water level warning light	
A3 : Insulation moiting	D6 : Connector, PAC	H9 : Chopper driver PCB	
B3 : E.A.S. connector	E6 : Frequency rpm regulator	I9 : Fuel filter heater	
C3 : E.A.S. PCB	F6 : Arc-Force selector	L9 : Air heater	
D3 : Booster socket	G6 : Device starting motor	M9 : ON/OFF switch lamp	
	H6 : Fuel electro pump 12V c.c.		



STARTER KEY

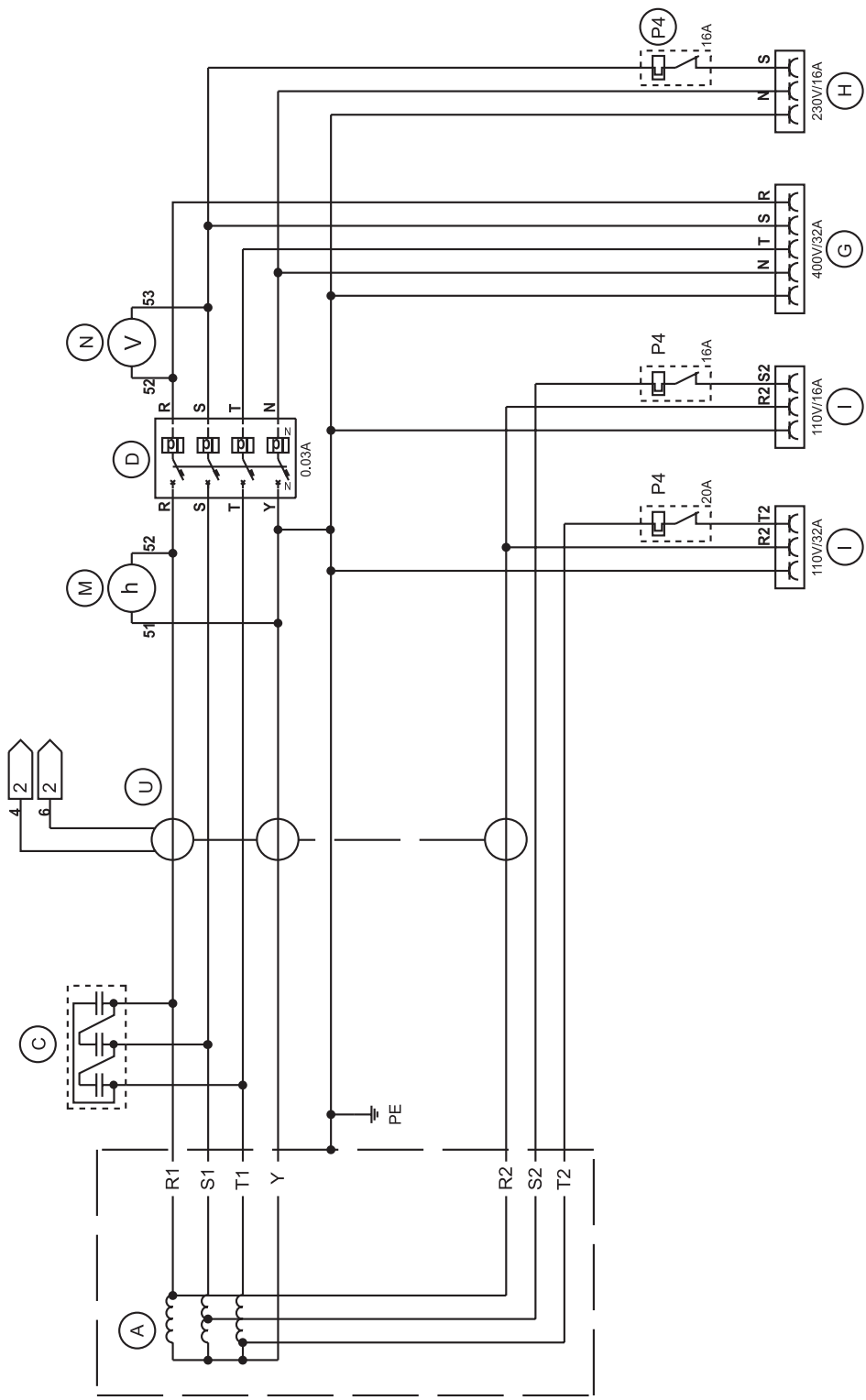
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ON	X	X	X
ST	X	X	X

Esq. Exp.	Modifica Modification	Data Date	Appr. Applic.
	Denominazione: Engine Lombardini 12LD477/2	Progetto: 37311.prg	di n° 4
	Macchina: Machine:	Dis. n°: 37310.S.010	di n° 2
	Designer: Balducci F.	Data: 01.10.2010	Appr. Applic.

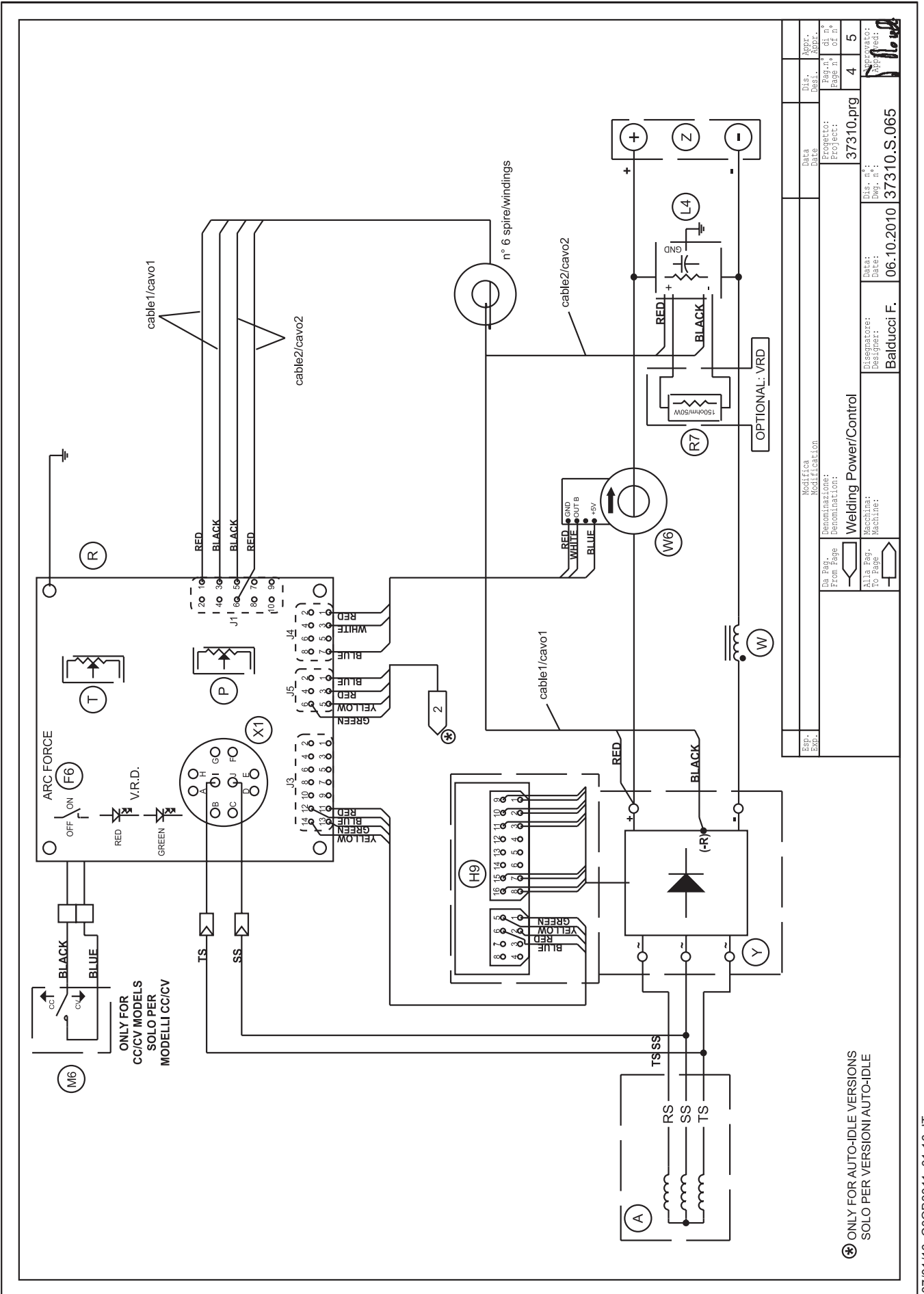


ESD Esp.	Modifica Modification	Data Date	Appr. Appr.
	Denominazione: Denomination:	37310.prg	3 4
	Aux. (400T/230Mx3) DT	Disegnatore: Designer:	Approvato: Appr.
	Macchina: Machine:	Balducci F.	
		Data: Date:	Dis. n.º: Dwg. n.º:
		06.10.2010	37310.S.020

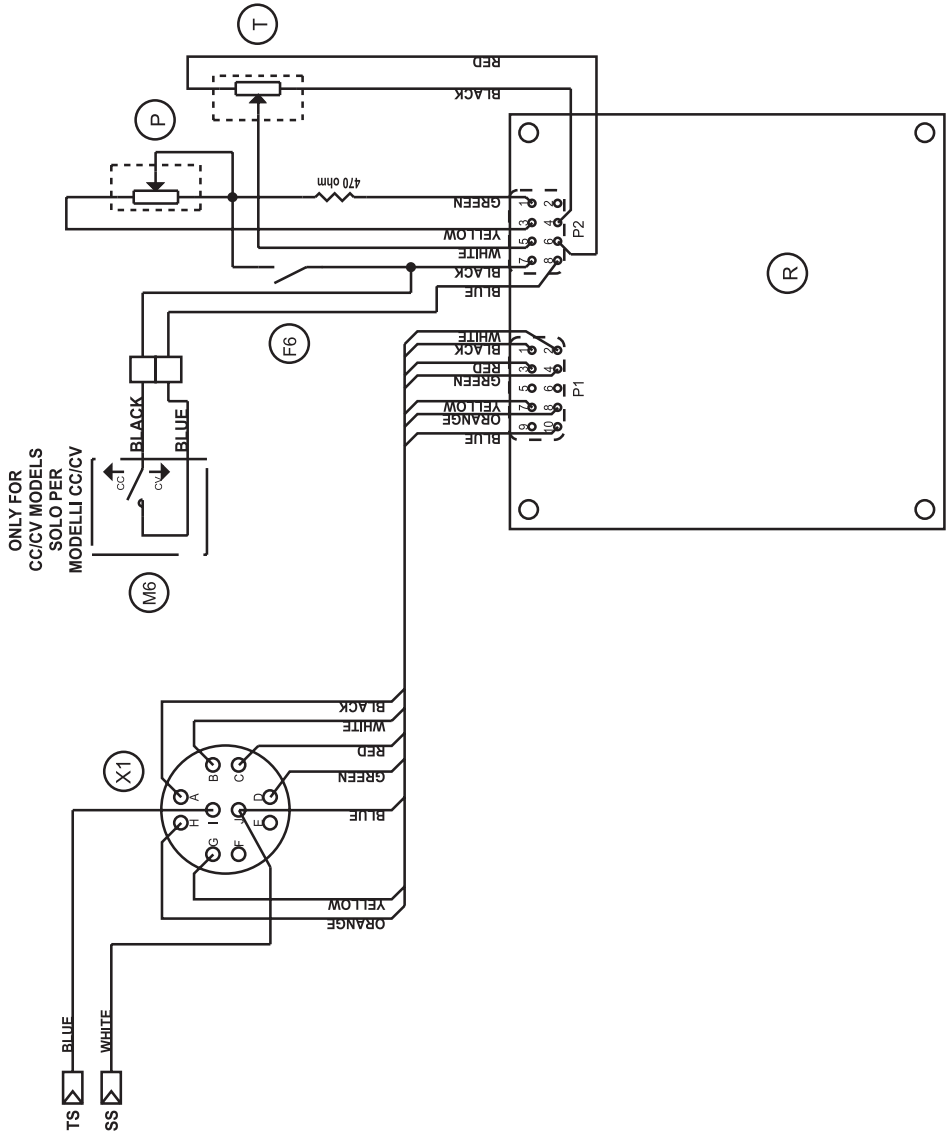
ONLY FOR AUTO-IDLE VERSIONS
 SOLO PER VERSIONI AUTO-IDLE



Ess. Ekv.	Modifica Modification	Data Date	Dis. Appr. Dis. Appr.
	Denominazione: Denomination:	Project: 37311.prg	Page n° of n° 3 4
Da Pag. From Page	Aux. (400T230M110Mx2) DT	Dis. n° Dwg. n°:	Approvato: Approvato:
Alla Pag. To Page		06.10.2010	37311.S.020
	Disegnatore: Designer: Balducci F.		



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



ONLY FOR
CC/CV MODELS
SOLO PER
MODELLI CC/CV

Esp. Evid.		Data Date	Dis. Desi.	Appr. Applic.	Pag. n° of n°
					5 5
Da Pag. From Page		Progetto: Project:		37310.prg	
Denominazione: Denomination:		Dis. n°: Dwg. n°:		14.04.2011 37310.S.066	
Alla Pag. To Page		Disegnatore: Designer:		Balducci F.	
		Macchina: Machine:			
		Approvato: Approv.			
		Modifica Modification:			



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