



ECO - ECP

SELF-REGULATING ALTERNATORS SERIES ECO-ECP

OPERATING AND MAINTENANCE INSTRUCTIONS

GB

ALTERNATORI AUTOREGOLATI SERIE ECO-ECP

ISTRUZIONI PER L'USO E LA MANUTENZIONE

IT

ALTERNATEURS AUTO-REGULES SERIE ECO-ECP

MANUEL D'INSTRUCTION ET DE MAINTENANCE

F

SELBSTREGELNDER GENERATOR SERIE ECO-ECP

BETRIEBS-UND WARTUNGSANLEITUNG

D

ALTERNADORES AUTOREGULADOS SERIE ECO-ECP

INSTRUCCIONES PARA USO Y MANTENIMIENTO

E

自调节式发电机 ECO-ECP系列

操作及保养手册

CN

САМОРЕГУЛИРУЕМАЯ ГЕНЕРАТОРЫ СЕРИИ ECO-ECP

ЭКСПЛУАТАЦИЯ И ТЕХНИЧЕСКОЕ ОБСЛУЖИВАНИЕ ИНСТРУКЦИЯ

RU

SAMOREGULAČNÍ ALTERN SERIE ECO-ECP

OPERACE A ÚDRŽBU

CZ

ÖNSZABÁLYOZÓ GENERÁTOR SERIES ECO-ECP

ÜZEMELTETÉSI ÉS KARBANTARTÁSI UTASÍTÁSOK

HU

SAMOREGULUJĄCY SERIES ALTERNATORY ECO-ECP

OPERACJE I KONSERWACJI

PL

AUTOREGLARE ALTERNATOARE SERIA ECO-ECP

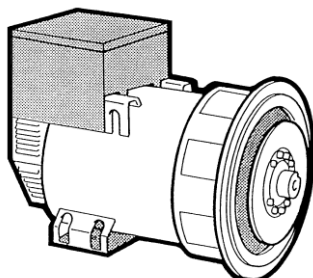
OPERĂȚIUNI INSTRUCȚIUNILOR DE ÎNTREȚINERE ȘI

RO

SAMOREGULAČNÉ ALTERNA SERIES ECO-ECP

OPERÁCIE A ÚDRŽBU

SK



INDEX

MACHINE DESCRIPTION pag. 2

INTRODUCTION pag. 3

MACHINE IDENTIFICATION pag. 3

INSPECTION ON DELIVERY pag. 3

SAFETY REQUIREMENTS pag. 3

TRANSPORT AND STORAGE pag. 8

MECHANICAL COUPLING pag. 9

ELECTRICAL CONNECTIONS pag. 12

STARTING AND STOPPING OPERATIONS pag. 16

CLEANING AND LUBRIFICATION pag. 16

MAINTENANCE pag. 16

DEFECTS AND REMEDIES pag. 26

SPARE PARTS pag. 27

TABLES pag. 30

OVERALL DIMENSIONS pag. 46

DSR APPENDIX pag. 52

DER1 APPENDIX pag. 56

MACHINE DESCRIPTION

ECO-ECP 2 and 4 pole alternators are brushless, self-regulating and incorporate a rotating inductor with damper cage winding and a fixed stator with skewed slots.

The stator windings have a shortened pitch to reduce the harmonic content of the output waveform.

The alternators are made in compliance with the 2006/42, 2006/95, 2004/108 CEE directives and their amendments, and the CEI 2-3, EN 60034-1, IEC 34-1, VDE 0530, BS4999-5000, CAN/CSA-C22.2 N°14 -N°100 regulations.

Tests to verify the electromagnetic compability have been carried out in the foreseen conditions by the standards with the neutral connected to the earth.

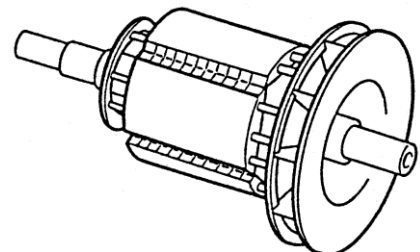
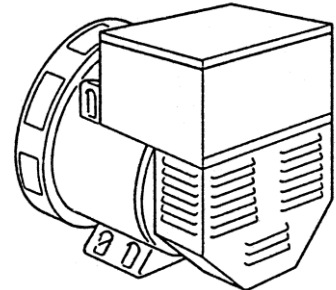
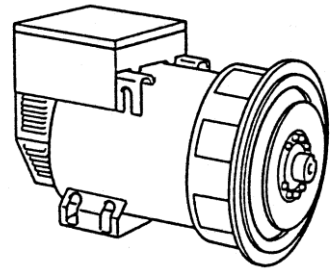
On customer's request alternators can be manufactured according to different specifications.

The robust mechanical construction gives good access to the generator output connections, and allows the user to inspect the various components with ease.

The casing is made of steel, the shields of cast iron, and the shaft of C45 steel and it has a keyed fan.

The mechanical protection level meets standard IP21 (upon request higher levels of protection can be supplied).

Insulation materials meet Class H requirements, and all rotating components are epoxy resins impregnated; higher voltage parts, such as the stators, are vacuum-treated (special treatments are available on request).

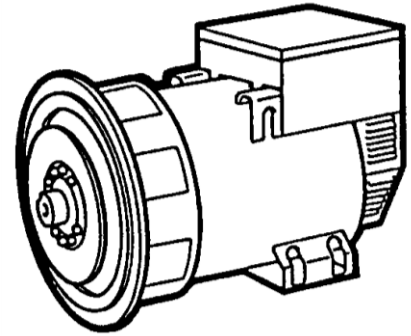


INTRODUCTION

The ECO-ECP alternators comply with the EEC 2006/42, 2006/95, 2004/108 directives and their amendments; therefore they pose no danger to the operator if they are installed, used and maintained according to the instructions given by Mecc Alte and provided the safety devices are kept in perfect working conditions.

Therefore a strict observance of these instructions is required.

Any reproduction of this manual is forbidden.



MACHINE IDENTIFICATION

Always indicate the generator type and code when contacting Mecc Alte or the authorized after sales service centres.

ID N	TYPE	PHASE	DUTY
DATE	RPM	INS. CL.	PF
KVA	C V.	A.	Hz
KVA	V.	A.	Hz
CONNECTION	EX. V.	EX. A.	
KVA	C V.	A.	Hz
KVA	V.	A.	Hz
IP	KG	J	
BEARINGS			
www.meccalte.com		=ISO 9001= SYSTEM CERTIFIED BY RINA	
		E300573	
		187983	
		CE	
		NORME EN 60028-1, IEC 60028-1, IEC 60028-1, IEC 60028-1, IEC 60028-1	
		MADE BY MECC ALTE	

INSPECTION ON DELIVERY

When the alternator is delivered, check that unit conforms with the delivery note and ensure that there are no damaged or defective parts; should there be any, please inform the forwarding agent, the insurance company, the seller or Mecc Alte immediately.

meccalte		DOCUMENTO DI TRASPORTO													
M.E.C.C. ALTE S.p.A. - Spazio Industriale		ID. P. R. 472 14/08/1995													
Via Salaria, 301 - 00138 Roma		Numero Documento													
Tel. 06/4981111 - Fax 06/4981112		998003006 / 13.12.2012													
e-mail: meccalte@meccalte.it		Completato da													
Ufficio: P.le A. 00198 Roma															
Sede: C. S. 00198 Roma															
Sede e Laboratorio: C. S. 00198 Roma															
<table border="1"> <thead> <tr> <th>No. articolo</th> <th>Descr. materiale</th> <th>Designato a cura</th> <th>Stato trasporto e imballaggio</th> <th>Altre osservazioni</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>				No. articolo	Descr. materiale	Designato a cura	Stato trasporto e imballaggio	Altre osservazioni							
No. articolo	Descr. materiale	Designato a cura	Stato trasporto e imballaggio	Altre osservazioni											
<table border="1"> <thead> <tr> <th> </th> <th> </th> <th> </th> <th> </th> <th> </th> <th> </th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>															
<table border="1"> <thead> <tr> <th> </th> <th> </th> <th> </th> <th> </th> <th> </th> <th> </th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>															
<small>Meccalte e i suoi prodotti sono marchi registrati di Meccalte S.p.A.</small>															

SAFETY REQUIREMENTS

Before any cleaning, lubrication or maintenance operation, ensure that the generator is stationary and disconnected from the power supply.

When stopping the generator, ensure the compliance with the procedures for stopping the prime mover.

The generator, in fact, has no Emergency Stop, but is controlled by the device arranged by the installer.



In consulting this use and maintenance manual, you will find several symbols, which have a specific meaning, as illustrated below.

CONVENTIONAL SYMBOLS AND SYMBOL DESCRIPTION

IMPORTANT

This symbol warns the personnel concerned that the described operation may cause damages to the machine if it is not carried out according to the safety standards.



CAUTION

This symbol warns the personnel concerned that the described operation may cause damages to the machine and/or injures to the personnel if it is not carried out according to the safety standards.



WARNING

This symbol warns the personnel concerned that the described operation may cause serious injuries or death to the personnel if it is not carried out according to the safety standards.



DANGER

This symbol warns the personnel concerned that the described operation may immediately cause serious injuries or death to the personnel if it is not carried out according to the safety standards.



SAFETY REQUIREMENTS

HANDLER

This symbol identifies the type of operator in charge of the operation described.

This qualification requires a complete knowledge and understanding of the information contained in the manufacturer's instruction manual as well as specific skills about the hoisting means, slinging methods and features and safe handling procedures.

**MECHANICAL SERVICE MAN**

This symbol identifies the type of operator in charge of the operation described.

This qualification requires a complete knowledge and understanding of the information contained in the manufacturer's instruction manual as well as specific skills necessary to perform installation, adjustment, maintenance, cleaning and/or repair operations.

**ELECTRICAL SERVICE MAN**

This symbol identifies the type of operator in charge of the operation described.

This qualification requires a complete knowledge and understanding of the information contained in the manufacturer's instruction manual as well as specific skills necessary to perform electrical operations such as connections, adjustment, maintenance and/or repair.

The electrical service man must be able to work even in case electrical cabinets and panels are live.



In case of exceptional operations and upon written request of servicing operations please apply to Mecc Alte authorized centers.

SAFETY REQUIREMENTS

Before installing the generator, arrangements must be made to earth the machine.

This is the reason why you must make sure that the grounding system is in good conditions and in compliance with the regulations of the country where the generator will be installed.

CAUTION

THE FINAL INSTALLER IS RESPONSIBLE FOR THE INSTALLATION OF ALL THE PROTECTIONS (SECTIONING DEVICES, PROTECTIONS AGAINST DIRECT AND INDIRECT CONTACTS, OVERCURRENT AND OVERVOLTAGE PROTECTIONS, EMERGENCY STOP, ETC.) NECESSARY FOR THE MACHINE TO COMPLY WITH THE EXISTING INTERNATIONAL/EUROPEAN SAFETY REGULATIONS.

For handling the unpacked generators, always use the special eyebolts only; use ropes having a suitable carrying capacity and do not lift the generator too much from the floor (max 30 cm.).

When the machine is worn cut, contact the companies in charge of the disposal of ferrous material and do not throw away its parts into the environment.

The operators in charge of the installation, operation and maintenance of the generators must be skilled technicians who know the characteristics of the generators.

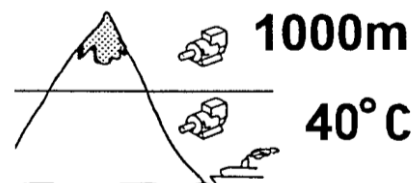
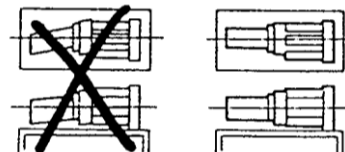
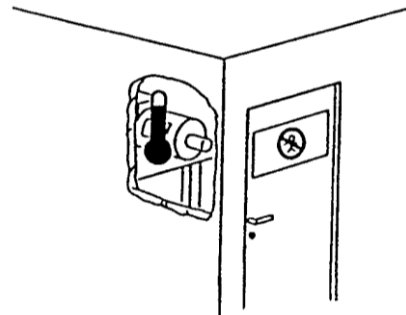
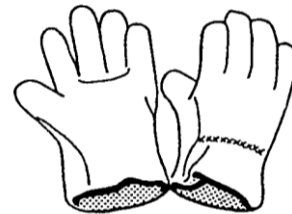
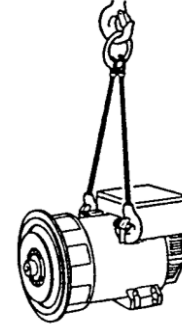
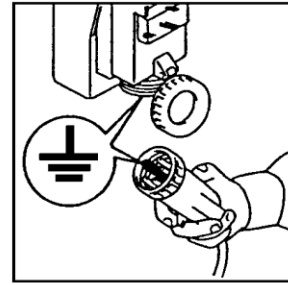
The people in charge of the handling must always wear work gloves and safety shoes. In case the generator or the whole plant must be lifted from the floor, the operators must wear a safety helmet.

The generator must be installed in an airy room. If there is not enough air, a malfunction or an overheating may occur (table 25 pag. 44). All entry doors into generator room should be clearly marked "Authorized persons only".

Make sure that genset foundations and baseframe are suitable to bear the combined weight of the alternators and prime mover.

The installer is responsible for the correct coupling of the generator to the engine and for the performance of all precautions necessary to guarantee the correct operation of the generator and avoid abnormal stress, which could damage the generator (such as vibrations, misalignment, strange noises or vibrations, etc.)

The machine was designed to guarantee the nominal power in environments with a maximum temperature of 40° C, at altitudes lower than 1000 m asl (EN60034-1), unless otherwise specified; for different operating conditions, see the commercial catalogue (brochure).



SAFETY REQUIREMENTS

No person must wear fluttering clothes (such as scarves, etc.) near the machine and any garment must be fastened with elastic bands at its ends.



The generators must never and for no reason run with following guards removed:

-) terminals cover
-) front covers
-) fan guards.



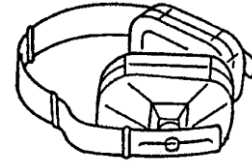
During assembling and disassembling operations, hold carefully both ends of the protection grid as the related material elasticity can be harmful.



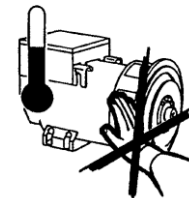
In some machines the regulators are equipped with 3 leds which can be seen from the outside (as standard equipment on large machines, as optional equipment on small machines):

- Green led** - correct operation
- Yellow led** - overload protection on
- Red led** - low speed protection on.

The generators are noisy ([table 25 pag. 44](#)); even if the sound level is certainly lower than that of the prime motor, they must be installed in soundproof rooms (room, engine room, etc.) where it is necessary to wear antinoise protectors.

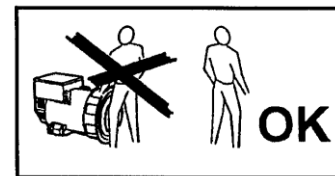


The generators produce heat proportional to the output. Therefore, do not touch the generator if you do not wear antiscorch gloves and, after switching it off, do not touch it until it has cooled down.



Even if all the machine components are protected, keep away from the machine.

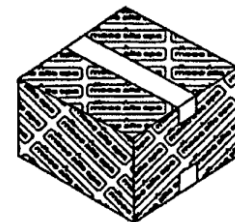
Do not lean or sit on the generator for whatever reason.



Do not remove the labels for whatever reason; on the contrary, if necessary, replace them.

DANGER OF SHORT CIRCUIT

The degree of protection of the generator is IP21; therefore it is made prohibition to use whichever type of hydrocleaner and to spray liquids over the parts containing electrical components.



In case of replacement of spare parts, use original spare parts only.

For the replacement of worn parts, carefully follow the maintenance instructions; these operations must be carried out by skilled technicians.

TRANSPORT AND STORAGE

Alternators will be packed for shipment in a manner suitable to their mode of transport and final destination.

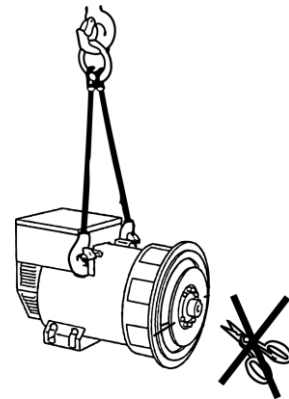
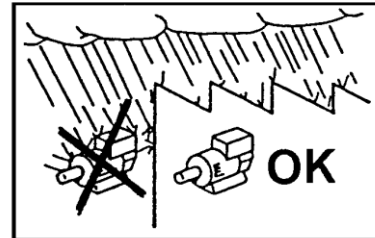
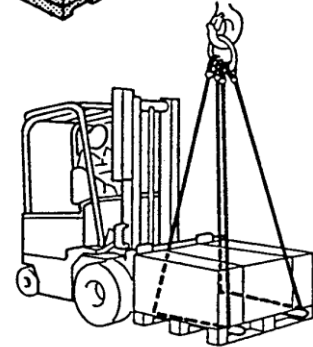
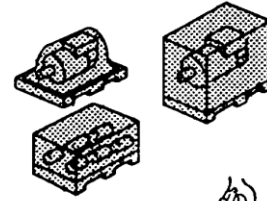
Prior to handling goods, please ensure that lifting equipment is of sufficient capacity. Under lifting conditions machinery should be elevated to a minimal distance from the ground.

When lifting or moving goods by forklift apparatus, care should be taken to ensure that forks are correctly positioned to prevent slipping or falling of pallet or crate.

Both packed and unpacked alternators shall be stored in a cool and dry room, and shall never be exposed to the inclemency of the weather.

With regard to single bearing alternators (form MD35) please ensure that the rotor fixing clamps is in place. Failure to do so may lead to slippage or assembly.

When installing the alternators, always lift them by using their eyebolts ([table 25 pag 44](#)).

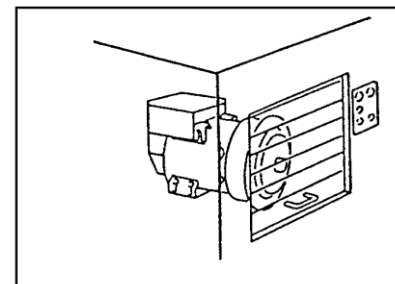
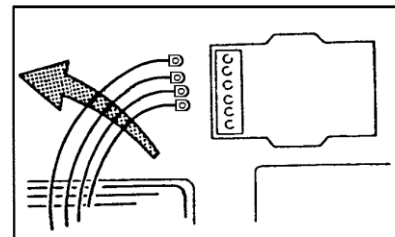


IMPORTANT :

AFTER PROLONGER STORAGE OR IF THE MACHINES SHOW SIGNS OF CONDENSATION, ALL WINDINGS SHOULD BE SUBJECTED TO INSULATION TESTS PRIOR TO OPERATING.

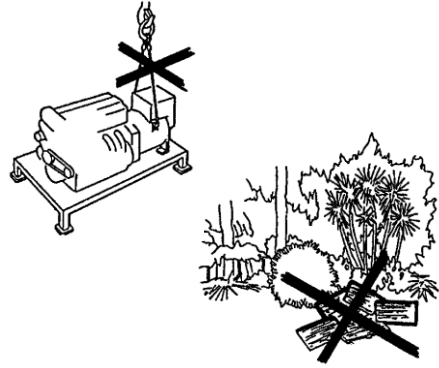
THE INSULATION TEST SHALL BE MADE BY SKILLED PERSONNEL.

BEFORE CARRYING OUT THE TEST, THE VOLTAGE REGULATOR MUST BE DISCONNECTED; IF THE TEST RESULTS ARE TOO LOW (LOWER THAN 1 MΩ)(EN60204-1) THE ALTERNATOR MUST BE DRIED IN AN OVEN AT 50-60°C.



TRANSPORT AND STORAGE

Once the generator is coupled with an engine, mounted on a baseframe, or installed on a complete generating set, it cannot be lifted by its lifting bolts. The relevant instructions for lifting complete generating set should be followed.



Any packing materials should be disposed of via correct waste disposal methods. Do not discard waste materials into the environment.

MECHANICAL COUPLING



For transit and storage purposes the generator flange spigot and the generator end shaft (for the generators in B3-B14 construction form) have been coated with a rust preventer that can be removed easily.

This **MUST BE** removed before assembling to the engine.

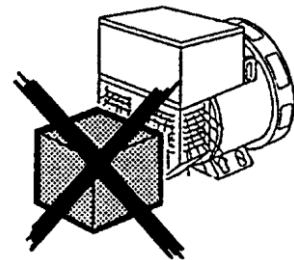
The mechanical coupling is under the sole responsibility of the final user, and has to be done at his discretion (for tightening torque see [tab. 24 pag. 43](#)).

A bad alignment may cause vibrations and bearing damages. It is advisable to verify the compatibility of the engine / generator torsional characteristics (by the customer).

The necessary data for this verification are available on the concerning documentation.

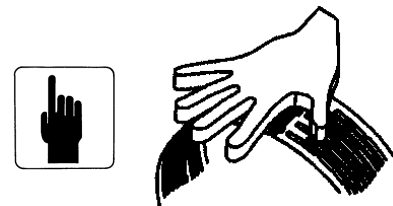
Warnings:

BEFORE STARTING THE ALTERNATOR, CHECK THAT THE AIR INLETS AND OUTLETS ARE FREE OF ANY OBSTRUCTIONS.

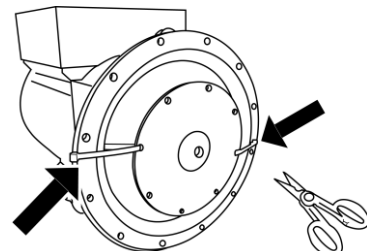


THE AIR INLETS SHOULD NOT BE NEAR ANY HEATING SOURCES. IN ANY CASE, IF NOT SPECIFICALLY REQUESTED, THE COOLING AIR TEMPERATURE MUST BE EQUAL TO THE ENVIRONMENT TEMPERATURE AND NEVER HIGHER THAN 40°C.

DURING ASSEMBLING AND DISASSEMBLING OPERATIONS, HOLD CAREFULLY BOTH ENDS OF THE PROTECTION GRID AS THE RELATED MATERIAL ELASTICITY CAN BE HARMFUL.



BEFORE MECHANICAL COUPLING OF SINGLE BEARING ALTERNATORS, REMOVE THE ROTOR SECURING DEVICE, IF FITTED, PLACED THERE TO PREVENT ROTOR FROM SLIPPING.



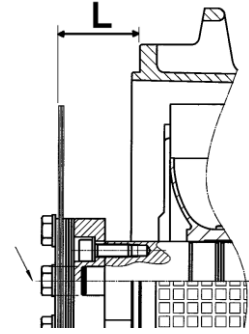
INSTRUCTIONS FOR THE ASSEMBLING OF GENERATORS WITH MD35 FORM

A bad alignment may cause vibrations and bearing damages. It is advisable to verify the compatibility of the engine / generator torsional characteristics (by the customer).

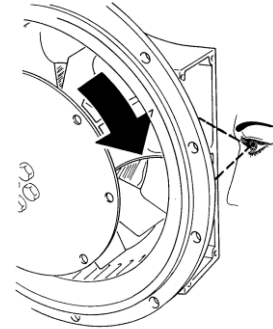
The necessary data for this verification are available on the concerning documentation.

For the coupling of a generator with MD35 form, proceed as follows:

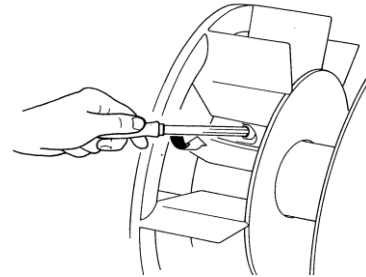
a) according to the type of the coupling, verify the correct placement of the discs (dimension "L") ([table 24 pag. 43](#)); if necessary restore the "L" dimension moving gently and axially the rotor. In the right position the clearance of rear bearing should be from 0.5 to 2 mm.



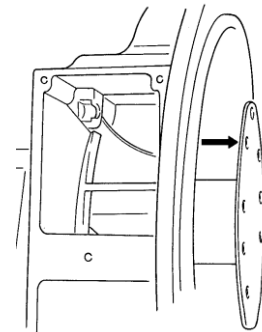
b) (For series 28) through one of the two lateral openings, and by manually rotating the rotor, detect the relevant clamp screw on the fan hub



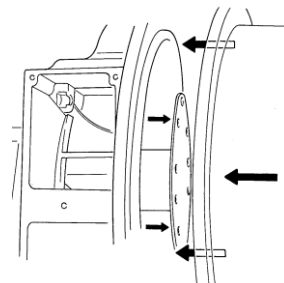
c) (For series 28) let the fan be free to rotate by slackening the M8 screw by means of an hexagonal wrench, possibly having an articulated head



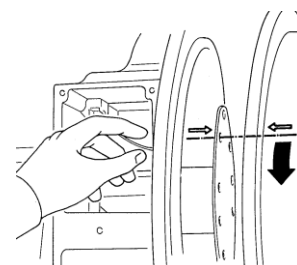
d) (For series 28) position one of the disk holes near the upper part of one of the side openings and place the slit that is on one of the fan blades, in the same position



e) move the generator close to the coupling engine

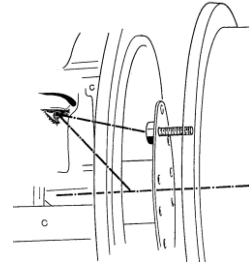
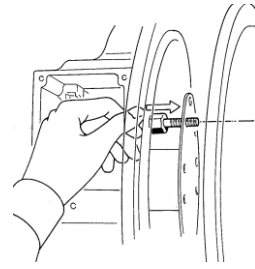


f) align one of the flywheel disk fastening holes with the holes of the previously positioned disks (point "d")

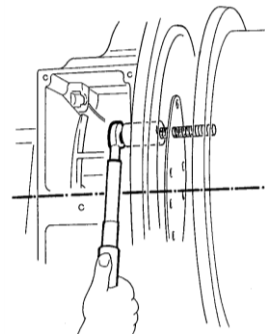


MECHANICAL COUPLING

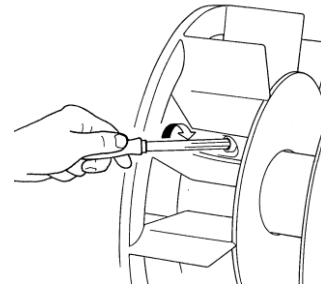
g) Insert and partially tighten the screws that lock the disks to the flywheel. Keeping the fan still (ECP28), turn the flywheel until another two holes are in the same position and partially tighten the screw. Repeat this operation for all the other holes



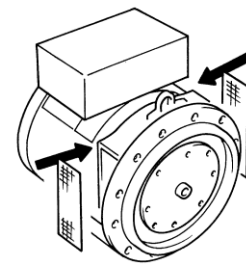
h) after inspecting the correct centring of the disks on the engine flywheel, the screws must be completely tightened



i) (For series 28) once the clamping of the disks is over, stop the fan once again by tightening the screw with a torque wrench setting adjusted at 20 Nm ± 10%; the radial position of the fan is not binding for the correct operation of the system

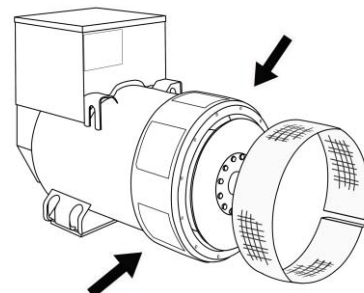


l) fix the protection grids supplied with the generator.



Compliance with items "l" and "l" is of the utmost consequence in order to avoid serious damages to the generator or hazardous situations for people or objects.

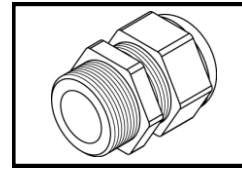
Only after a correct mechanical coupling, proceed with the electrical connections



ELECTRICAL CONNECTIONS



All electrical output connections are the responsibility of, and are at the discretion of, the end user.
 When making terminal box connections, all cable and terminal lugs should meet the relevant standards of the country of final destination.



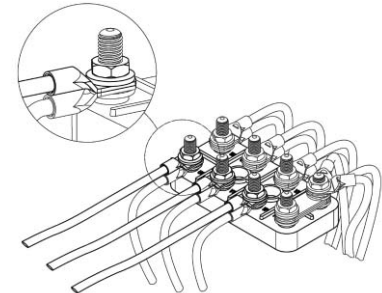
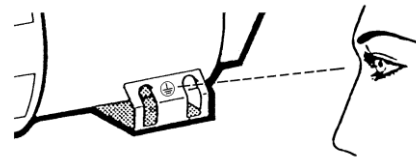
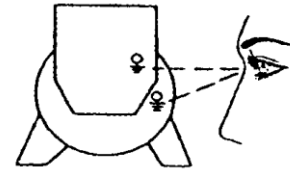
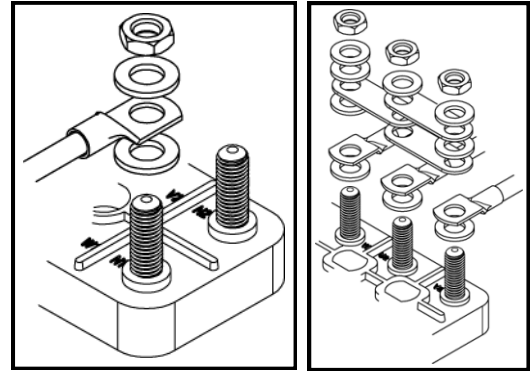
WINDINGS CONNECTION

All alternators feature both star with neutral (Y) and delta (Δ) connections (table 2 pag.31).

To reconnect from a star to delta connection (for ex. from 400V to 230V), modify the linking arrangements on the output terminal board (see diagram on table 2 page 31).

It is not necessary to adjust the voltage regulator.
 Standard alternators are equipped with 12 cables to offer different voltages (ex.230 / 400 / 460 / 800V).

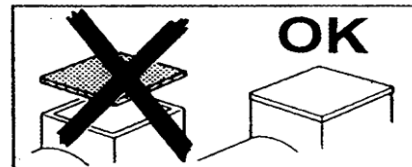
The alternator must always be earthed by sufficiently rated cable, using one of the inside or outside terminals. For the electrical connections use wires suitable for the power of the generator and connect them to the terminal board as indicated on table 12 or 17.
 After completing output connections (for tightening torque see tab. 24 pag. 43), ensure that the terminal box cover is securely in place.



IMPORTANT: frequency variations.

A standard production machine wound for 50 Hz can also function at 60 Hz (and vice versa) by resetting the A.V.R. voltage potentiometer to the new nominal voltage value. When changing from 50 to 60 Hz the alternator power, and nominal voltage will increase by 20%, but the current does not change from 50 Hz value. Should voltage stay at 50 Hz nominal value, then the output power may be increased by 5% due to improved ventilation.

For machines wound for 60 Hz, changing to 50 Hz, the voltage and power values have to decrease by 20% of 60 Hz value.

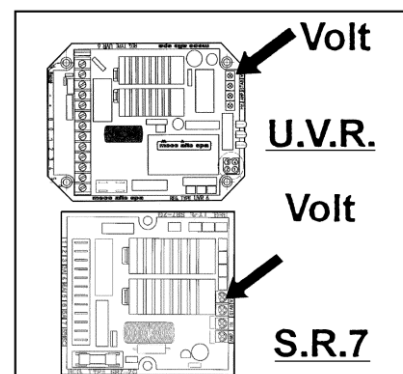


REGULATORS (table 3 pag 31)

Either U.V.R.6/1-F and S.R.7/2-G regulators can be used on the ECO-ECP series without affecting performances.

The U.V.R.6/1-F is a standard feature on the 38 - 40 - 43 - 46 models whereas the S.R.7/2-G is standard on the 28 - 31 - 32 - 34 series.

The two regulators ensure the same level of performance but have different signal systems and references.



IMPORTANT:

the generator output voltage must be checked under no-load conditions, with the correct setting of frequency.

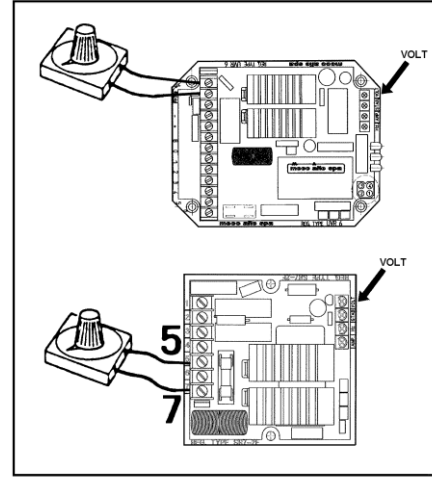
The voltage may be adjusted by $\pm 5\%$ of the nominal, by acting upon the voltage potenziometer on the electronic regulators.

It is possible to get a remote voltage regulation of $\pm 5\%$ inserting in the proper terminals a 100K potentiometer (for the 6 lead units) or a 100K potentiometer with a 100K resistance in series (for the 12 lead units)

Instructions to follow for the external potentiometer connection :

CAUTION: in order to get a correct working of the alternator, it is necessary to follow the following procedure, connecting the external potentiometer.

- 1) Turn the VOLT trimmer of the electronic regulator completely anticlockwise.
- 2) Set the external potentiometer at half turn and connect it to the proper terminals of the electronic regulator.
- 3) Adjust the voltage at the nominal value by the VOLT trimmer of the electronic regulator.

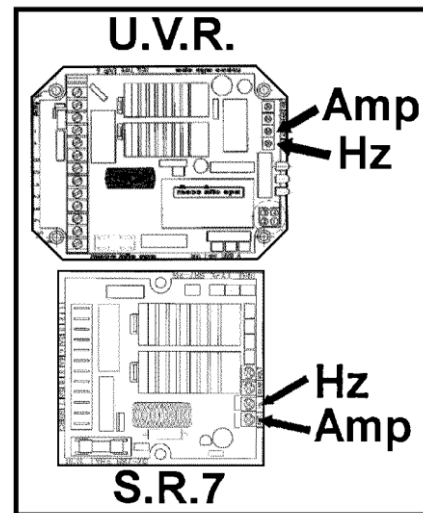


PROTECTIONS

U.V.R.6/1-F - S.R.7/2-G

Both regulators are provided with an underspeed protection with an intervention threshold which can be adjusted by the potentiometer marked "Hz". This protection intervenes instantaneously by reducing the alternator voltage to a safe value when frequency falls below 10% of the nominal value. These regulators also have inherent overload protection which senses the exciter field voltage value. Should this field voltage value exceed the nominal value for a period of more than 20 seconds, then again the alternator voltage is automatically reduced to a safe operating level. This overload function has a built-in delay to allow for the overload when starting motors (normally 5-10 seconds). The operating threshold of this protection device is adjustable by the potentiometer marked "AMP".

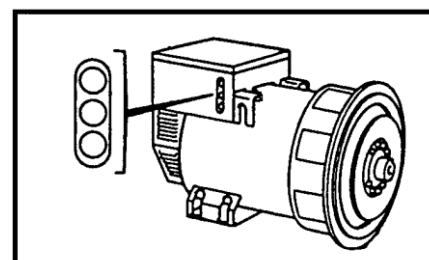
NOTE : When using the machine in single phase, or for voltages different from the one pre-set at the factory, recalibration of the AMP and STAB potentiometers could be necessary.



U.V.R.6/1-F

Aside from the above mentioned characteristics, the U.V.R.6/1-F regulator also offers the following:

- 1 - possibility to have single-phase as well as three-phase sensing.
- 2 - led indicators for self-diagnosis which indicate the unit's operational conditions: a green led which when lit confirms the alternator's normal functioning; a red led indicates the underspeed protection is on; a yellow led indicates the overload protection is on.



IMPORTANT

In normal functioning, only the green led has to be lit.

All these indicators can be remotely controlled and adjusted, for any type of use, by utilizing the SPD96/A accessory which is available on request.

INTERVENTION OF PROTECTION DEVICES CAUSES.

Underspeed protection instantaneous intervention:

1 - speed reduced by 10% of nominal RPM.

Delayed intervention of overload protection:

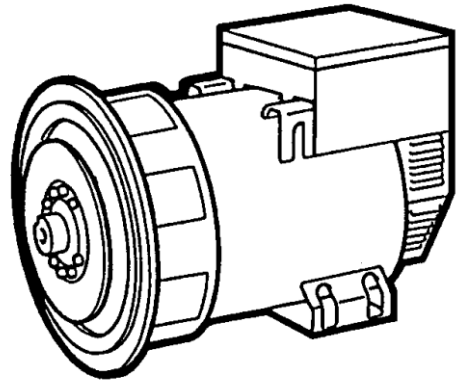
2 - overload by 20% of nominal rating.

3 - power factor ($\cos \varphi$) lower than the nominal-one.

4 - ambient temperature above 50°C.

Intervention of both protections:

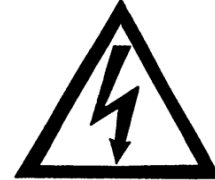
5 - combination of factor 1 with factors 2, 3, 4.



In case of intervention the output voltage will drop down to a value which will depend on the fault.

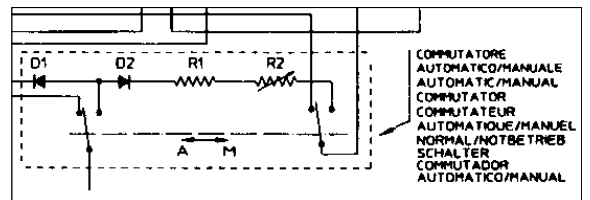
The voltage will return automatically to its nominal value as soon as the fault is removed.

For further details on regulators, please see the specific manual.



OPTIONALS :

All ECO-ECP series alternators can function with manual regulation, without assistance from any external source, by using a rheostat (tab. 10-11 pag. 36).



PARALLEL OPERATION

Should the alternators be required to operate in parallel, it is necessary to add a paralleling device to ensure equal droop of generator output voltages.

This ensures that if the machines are operated separately, the voltage droop (4% approx.) is equal when switching from no-load to full load.

The parallel device is fitted as standard on 40 - 43 - 46 models, therefore when two or more of these units must function in parallel, it is sufficient to remove the bridge which shortcircuits the secondary winding of the parallel device.

On smaller models this device is mounted on request or it can be added (except for ECP28/4) by the client himself following the instructions of tables 14-16-18-20.

After the device has been mounted, check whether the connection has been properly made; make sure that there is a voltage drop of approximately 4% in the machines when they function individually switching at rated speed and $\cos\phi$ 0.8 from no-load to full load operation.

HOW TO MOUNT THE PARALLEL DEVICE

Referring to tables 14-16-19 mount parallel device as indicated.

Connect the power turns in series with phase.

The numbers of turns to be wound on the transformer will be indicated in the instruction accompanying the transformer itself.

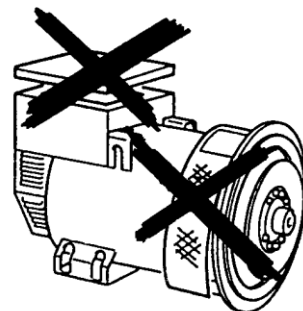
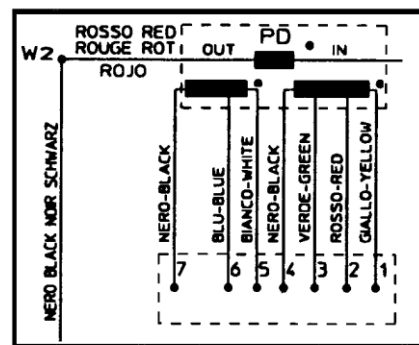
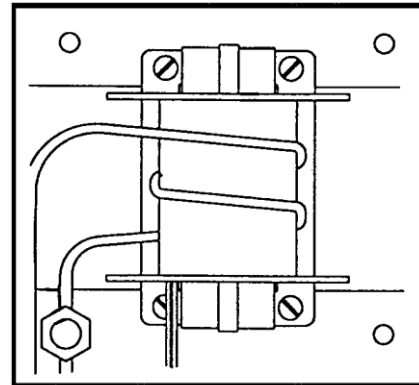
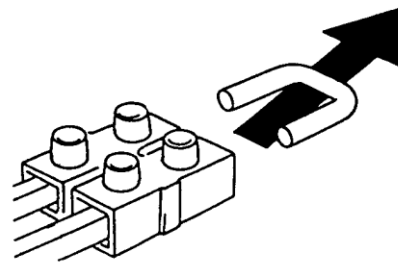
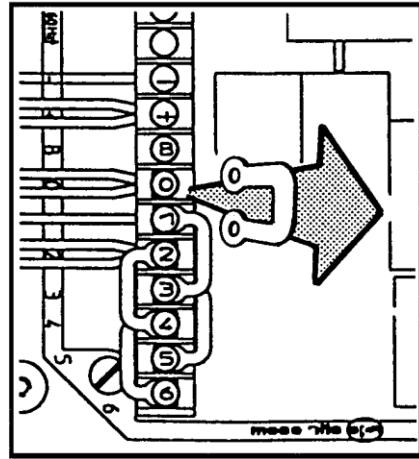
The secondary winding of the parallel transformer must be connected in series to the sensing of the electronic regulator as shown on tables 4 - 5 page 32.

In order to activate the parallel device remove the bridge which shortcircuits the secondary winding of the device itself as shown in the above mentioned tables.

NOTE

When requesting a parallel device, it is necessary to indicate the nominal data of the alternator on which the device will be applied.

After all the electric connections have been made and only **after all the protections have been put in place**, can the system be started.



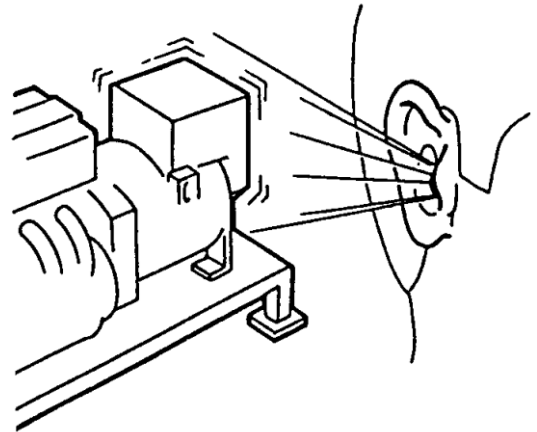
STARTING AND STOPPING THE OPERATIONS

All the instrumentation for starting, running and stopping the system shall be provided by the installer.

THE STARTING, RUNNING AND STOPPING OPERATIONS MUST BE CARRIED OUT BY SKILLED PERSONNEL WHO HAVE READ AND UNDERSTOOD THE SAFETY INSTRUCTIONS AT THE BEGINNING OF THIS MANUAL.

IMPORTANT :

When the system is set to work for the first time, which has to be done at a reduced speed, the operator shall check that no anomalous noises can be detected.
If an anomalous noise is detected, stop the system immediately and improve the mechanical coupling.



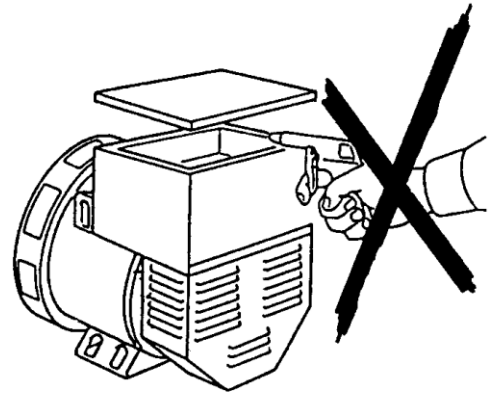
CLEANING AND LUBRIFICATION

Prior to approaching or touching the alternator, ensure that it is not live and it is at room temperature; at this stage it is possible to clean it on the outside using compressed air.

NEVER USE LIQUIDS OR WATER.

DO NOT CLEAN THE INSIDE ELECTRIC COMPONENTS WITH COMPRESSED AIR, BECAUSE THIS MAY CAUSE SHORT-CIRCUITS OR OTHER ANOMALIES.

For the lubrication of bearings, see [table 23 on page 42](#).



MAINTENANCE

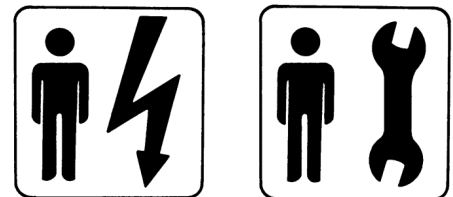
The alternators series ECO-ECP are designed to give a long maintenance free working life.



BEFORE PERFORMING THIS OPERATION, READ THE SAFETY REQUIREMENTS AT THE BEGINNING OF THIS MANUAL CAREFULLY.

Maintenance operations on Mecc Alte generators can be divided into routine and extraordinary maintenance operations; in both cases, all operations must be authorised by the safety representative and they must be carried out when the machine is turned off and insulated from the electric installation or from the power mains.

High qualified mechanical or electrical technicians must carry out maintenance operations and any fault search since all operations described hereunder could put personnel in serious danger. It is also highly recommended to take all the necessary precautions so as to prevent an inadvertent starting of the machine during maintenance and fault search operations..



Routine maintenance operations can be summed up as follows:

- a) Assessment of windings conditions after long periods of storage or inactivity
- b) Assessment, on a regular basis, of correct functioning (absence of anomalous noises or vibrations)
- c) Mechanical inspections on all fastening bolts and, in particular, on electric connections
- d) external cleaning of generator

a) Assessment of windings conditions after long periods of storage or inactivity.

Measuring the insulating earth resistance can assess the condition of the windings. This measurement can be carried out with a "Megger" device, or similar, with a 500V direct-current voltage. It is very important to disconnect the voltage regulator (fig. a), the rotating diode bridge (fig. b) and the radio-interference filter (fig. c), as well as any other device connected to the windings to be checked, before carrying out the measurement.

The figure resulting from the measurement of the windings' earth resistance must be over $1M\Omega$.

Should the figure be smaller than the above mentioned one, the windings must be adequately dried up. This can be done by directing a jet of hot air of about $50-60^{\circ}\text{C}$ into the generator's air inlets or outlets; alternatively, the stator's windings can be electrically connected and a voltage can be passed through them by means of a directcurrent power supply. The amount of current in the windings depends on the generator size, even though it must be fixed according to the nominal values stated on the plate.

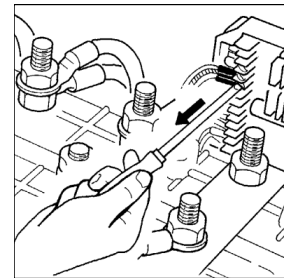


fig. a

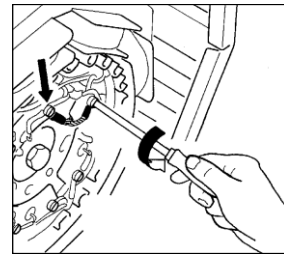


fig. b

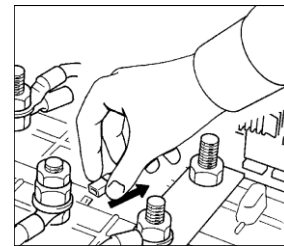
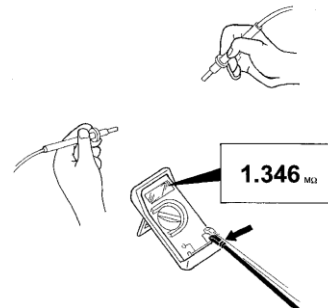


fig. c

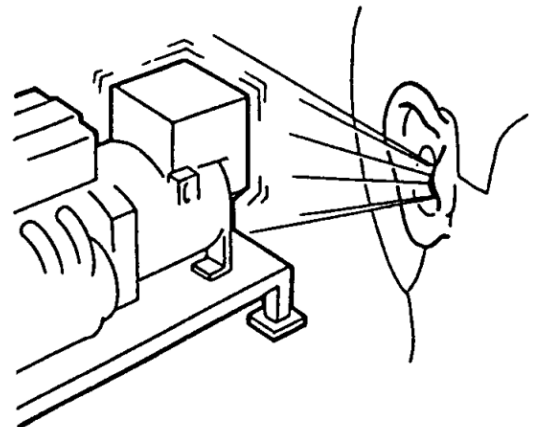


b) Assessment of current functioning (absence of anomalous noises or vibrations).

We recommend users to check regularly the correct functioning of the generator, and to verify that there are no anomalous noises or vibrations; their presence might indicate damage of bearings.

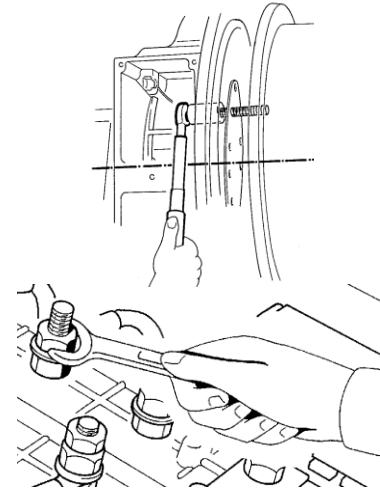
May we remind you that the alternator itself has no particular vibration since the rotating parts are perfectly balanced. Provided that the rotor balancing has not been altered and that the rotor's bearings have not been damaged, vibrations in the generator set may occur due to alignments of couplings, due to stress upon the combustion engine, or to vibration mounts.

We also recommend checking of performance data which must comply with the data on the generator's plate.



c) Mechanical checks of fastening bolts and, in particular, of electric connections.

We recommend a regular check of all fastening bolts, which must be perfectly tightened up. Special attention should be paid to all electric connections; this inspection must be carried out in the complete absence of voltage. To choose the correct tightening wrenches suitable for the different sizes of the bolts, see generator manual.

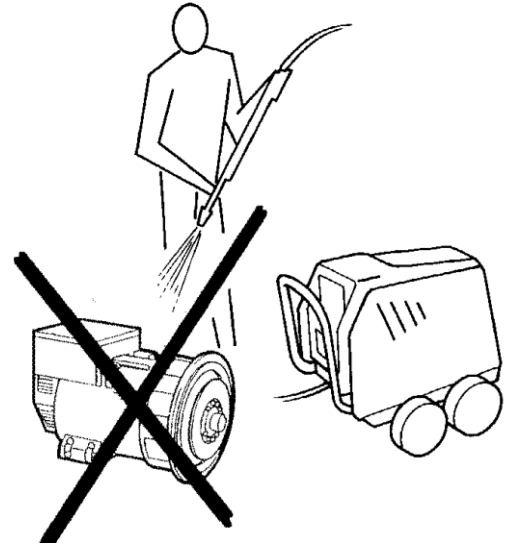


d) Internal and external cleaning of the generator.

For the external cleaning of the generator, you can use compressed air. The use of hydrocleaners and detergent fluids is strictly forbidden. The standard protection degree of the generator is IP21; therefore, use of fluids could cause anomalies or even short-circuits.

Extraordinary maintenance operations can be summed up as follows:

- Maintenance and replacement (if necessary) of bearings
- Cleaning of air filters (if available)
- Cleaning of windings
- Replacement of diode bridge
- Replacement of exciter
- Replacement of voltage regulator
- Check of residual voltage



a) Maintenance and replacement (if necessary) of bearings.

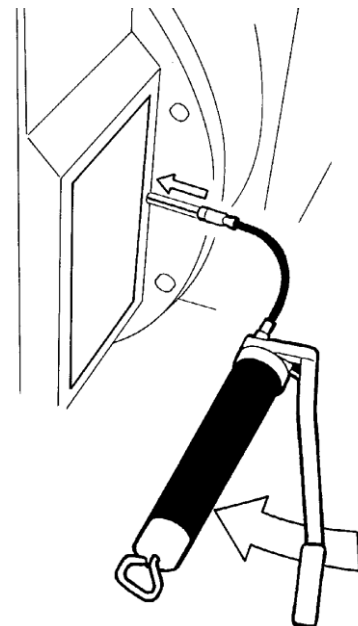
During the assembling phase, all bearings are greased with SKF LGMT2 grease, or similar.

All generators, except the ECO40, the ECO43N and ECO46 versions, are equipped with sealed bearings; for this kind of bearing, no maintenance is required for the total operating time (estimated: 30.000 hours).

Bearings of alternator versions 40, 43 and 46 must be greased on a regular basis by means of a pressure grease cup (see bearings chart).

During the operating time, checks to detect presence of either overheating, or noises, must be carried out on a regular basis.

If the bearing is worn off, it can cause excessive vibrations. In such a case, the bearing must be removed, examined, and if necessary, replaced.

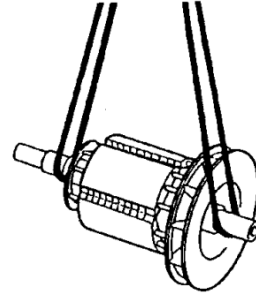
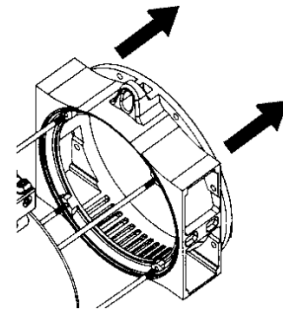


A description of the procedure for a bearing replacement.

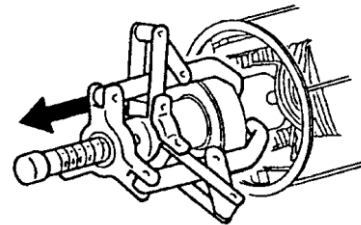
Generator versions: 28-31-32-34.

To disassemble alternator versions 28-31-32-34, follow these instructions:

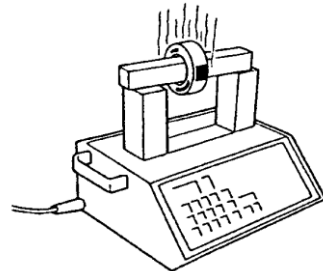
-) Remove front cover
-) Use a lifting device equipped with soft ropes of an adequate lifting capacity to extract rotor. Make sure that the lifting devices are suitable for the weight of the parts to be shifted



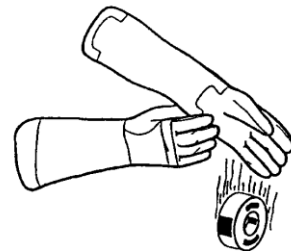
-) To pull the bearing out, use a puller



-) To insert new bearing, heat it with a suitable magnetic device



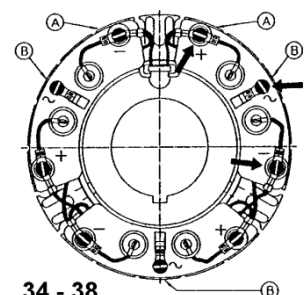
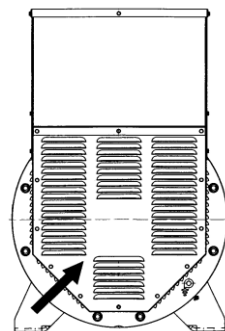
-) Put on safety gloves and insert bearing into its place



Generator versions: 38-40-43-46.

To disassemble alternator versions 38-40-43-46, remove exciter as follows:

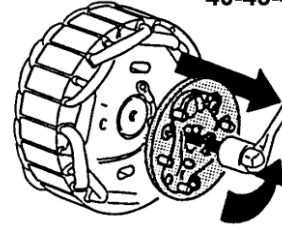
-) Remove rear seal
-) Disconnect the five wires of the rotating diode bridge "A" and "B".



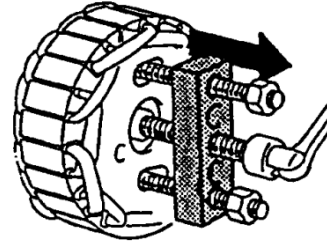
34 - 38

40-43-46

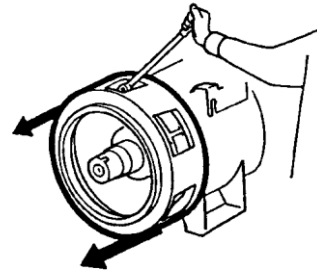
-) when dealing with versions 38, remove clamp screws from the diodes area of the rotating bridge, whilst when dealing with versions 40, 43 and 46, remove clamp bolt and, by pulling it gently, remove Diode Bridge



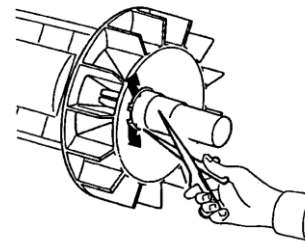
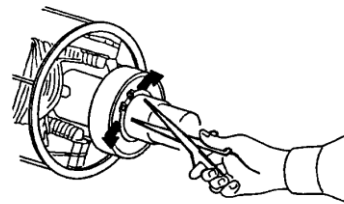
-) insert an adequate puller to pull out exciter rotor



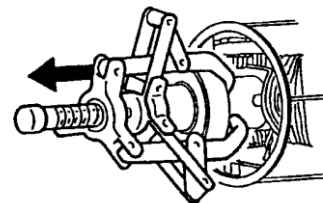
-) Pul out rotor from the drive end side; should the front lead diameter be smaller than the impeller's external diameter, remove lid to pull out rotor



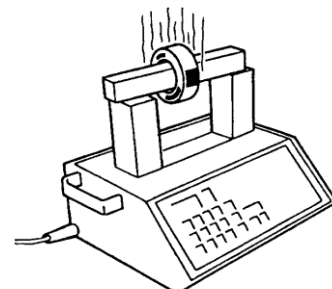
-) use a pair of suitable pliers to remove seeger rings



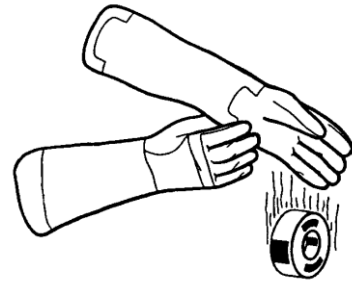
-) use a suitable puller to remove bearing



-) to insert new bearing, heat it with a suitable magnetic device

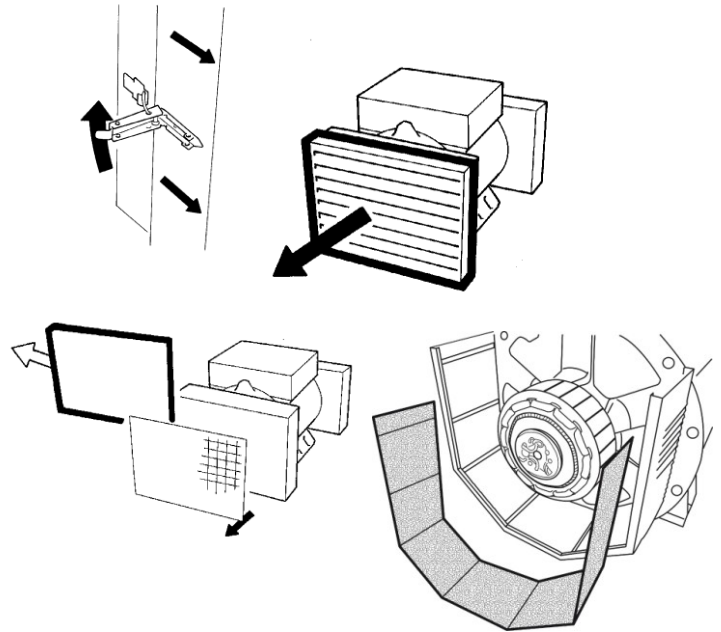


-) Put on safety gloves and insert bearing into its place



b) Cleaning of air filters (if available)

Air filters are optional parts that are supplied upon request; these devices must be cleaned on a regular basis; inside these filters there is a mesh net that has to be kept clean in order to ensure a good performance of the filter. The time interval between each cleaning operation depends on the conditions of the installation site. A frequent inspection of these parts will establish if any cleaning is required. Make sure you turn off the generator set when performing cleaning operations of such parts as their removal entails contact with live parts.



c) Cleaning of windings

Both windings and generator will last longer with a correct maintenance and cleaning; an inspection and a maintenance schedule should be established by keeping in mind that the frequency of these inspections depends on the conditions of the site where the generator is being used.

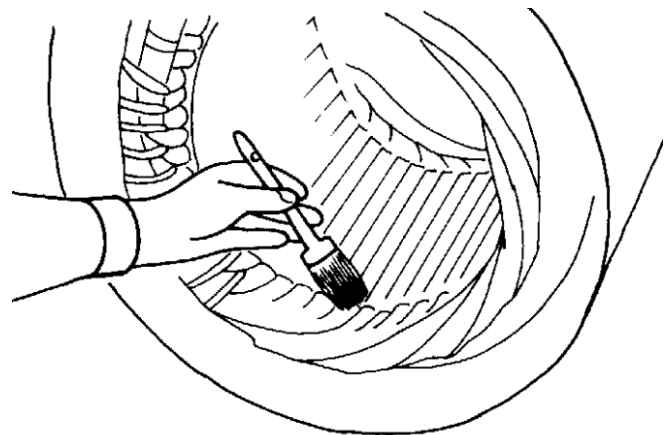
If the generator is used in a dry and clean environment, an inspection a year is enough; in case of severe conditions, inspections must be carried out more frequently.

However, we recommend that a check should be done, regardless of the schedules, in the following cases:

-) in case of rust
-) in case of corrosion
-) when the insulation is damaged
-) when there is dust on the surface of the windings

To clean windings, use solvents like oil of turpentine or “Solvesso” solvent. Cleaning with such substances, which contain a high evaporation level, will not damage the isolation level of the windings. When cleaning is over, please look out for any overheating or carbonisation signs.

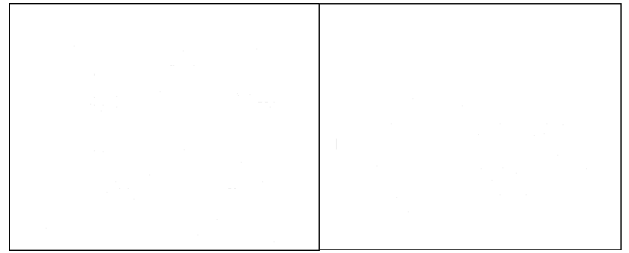
We also recommend drying up of windings at 60-80°C and if you notice that the varnish of windings is not in good shape, then have them varnished again.



d) Replacement of diode bridge

The diode bridge varies according to the model of the generator. It can have three separate sectors with two diodes fixed on each sector (T30), or one circular body (T18) with 6 diodes. The first type (T30) is used in the alternator models 34-38, whereas the second one (T18) is used in the 40,43 and 46 versions.

Diodes can be easily inspected with a multimeter: simply disconnect the wire of the particular diode and check its resistance on both directions. A perfectly functioning diode will show a very high resistance in one direction and a very low resistance in the opposite direction. A faulty diode will show either a very low resistance, or an infinite resistance in both directions. Once the whole sector, or the whole bridge, is replaced, remember to tighten the screws with a suitable tightening wrench and to strictly comply with the polarities and the diagrams indicated by Mecc Alte.



Generator versions 28-31-32.

Procedure to check the diodes of the exciter rotor.

Necessary equipment :

- 12V battery
- 12V-21W lamp (or alternatively 6.8Ω-30W Resistance)
- Voltmeter (for instance, multimeter on scale VOLT d.c.)

IMPORTANTE

Warning: before performing the following actions, it is necessary to disconnect the 2 cables connecting the main rotor to the diode bridge (+and-).

TEST OF THE DIODES ON THE “NEGATIVE”

- Connect the equipment, as it is pointed out in the picture A ([table 26 page 45](#))
- Fix the cable connected to the lamp to the negative terminal of the bridge, as it is pointed out in the picture A ([table 26 page 45](#))
- Connect the terminal “Probe” to the point A1 (it is checked the diode 1), then to the point A2 (it is checked the diode 2) and finally to the point A3 (it is checked the diode 3); check the readings on the voltmeter in relation with what is reported on the table ([table 26 page 45](#)).



TEST OF THE DIODES ON THE “POSITIVE”

- Connect the equipment, as it is pointed out in the picture B ([table 26 page 45](#))
- Fix the cable connected to the negative terminal of the battery to the positive terminal of the bridge, as it is pointed out in the picture B ([table 26 page 45](#))
- Connect the terminal “Probe” to the point A4 (it is checked the diode 4), then to the point A5 (it is checked the diode 5) and finally to the point A6 (it is checked the diode 6); check the readings on the voltmeter in relation with what is reported on the table ([table 26 page 45](#)).



INSTRUCTIONS TO REPLACE THE DIODE

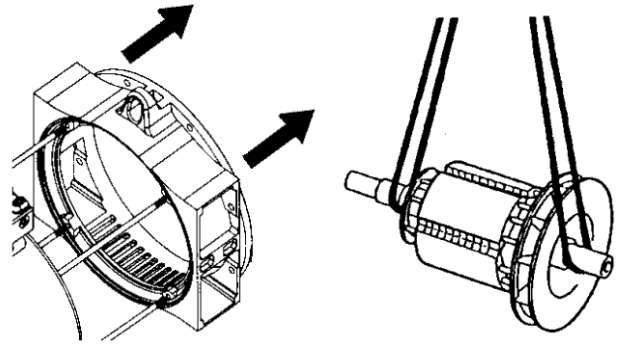
When the values measured point out a diode damaged, it is necessary to replace the component.

For this purpose it is recommended to not pull the rheophores out from their locations, but to cut them near to the body of the component; then fit in the new component respecting the polarity and soft solder accurately the rheophores with the pieces remained in their locations.

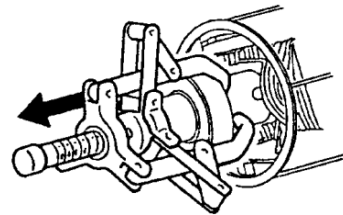
**e) Replacement of exciter
Generator versions 28-31-32-34.**

Follow these instructions to remove exciter of the 28-31-32-34 versions:

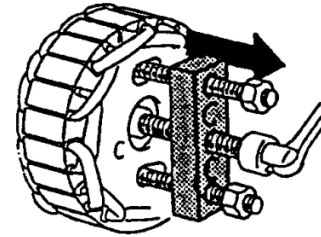
-) remove front lead
-) Use a lifting device equipped with soft ropes of an adequate lifting capacity to extract rotor. Make sure that the lifting devices are suitable for the weight of the parts to be shifted



-) Use a puller to pull out bearing



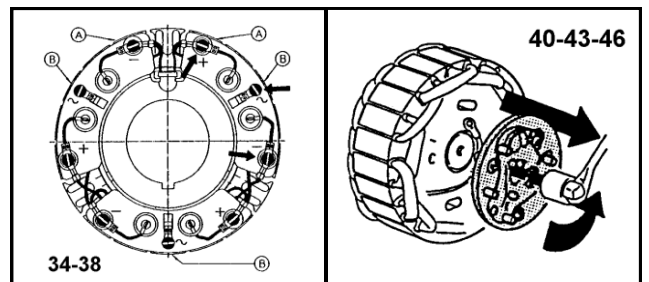
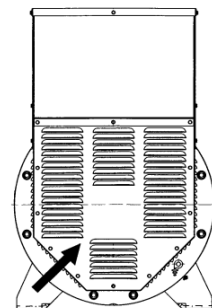
-) To remove the exciter rotor, use a suitable puller, which can be easily constructed or forwarded by the manufacturer upon request.



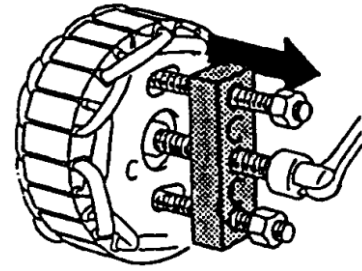
Generator versions 38-40-43-46.

To remove exciter of the 38-40-43-46 versions, there is no need to disassemble the entire generator, however, you must follow the instructions below:

-) Remove rear seal
-) Disconnect the five wires of the rotating diode bridge
-) When dealing with the 38 versions, remove clamp screws from sectors; whilst when dealing with the 40-43-46 versions, remove clamp bolt and, by pulling it gently, pull out diode bridge



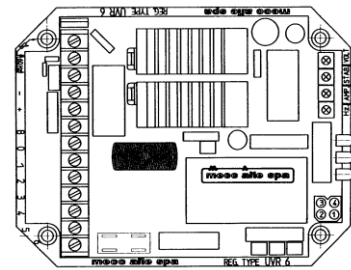
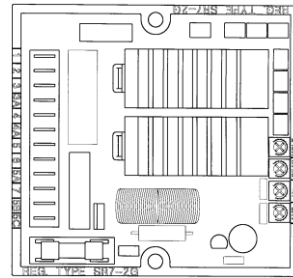
-) To insert exciter rotor, use a suitable puller, which can be easily constructed or forwarded by the manufacturer upon request.



f) Replacement of voltage regulator

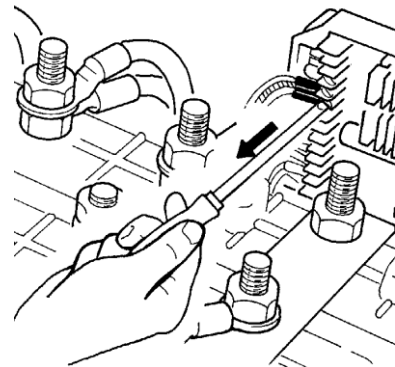
All generators are equipped with an automatic voltage regulator; depending on the alternator model, electronic regulators can be of two different types: SR7/2-G, UVR6/1-F.

The SR7/2-G is an integral part of the 28-31-32-34 generators; the UVR6/1-F is supplied with the 38-40-43 and 46 versions. Should some anomalous functioning be detected, please consult our technical manual or contact our technical assistance service.

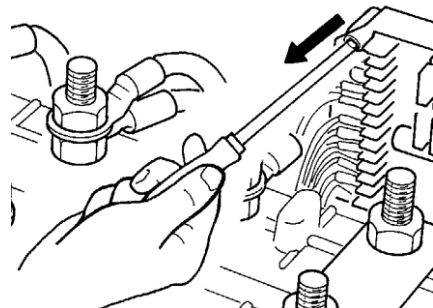


Once it has been ascertained that the regulator needs to be replaced, proceed as follows :

-) Disconnect all terminal board wires



-) Unscrew the 2/4 clamp screws of the regulator



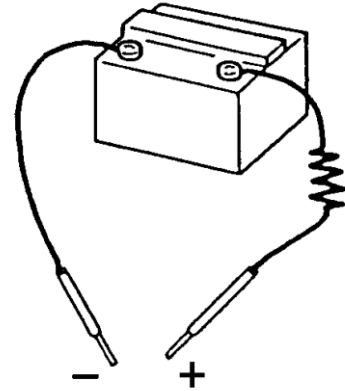
-) Set new regulator in the usual position
-) Tighten the new regulator with the previously unscrewed screws
-) Connect again all wires to the terminal board of the regulator. Follow diagrams supplied by Mecc Alte, if necessary.

g) Check of residual voltage

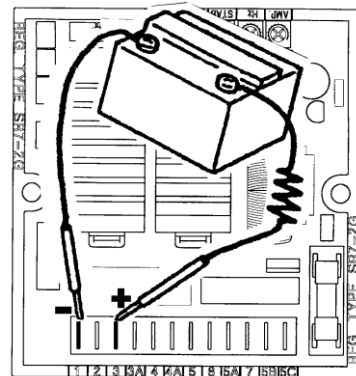
For generators equipped with an electronic regulator, you must perform the following procedure. This must be applied to ensure that the generator is not over-excited (in such a condition, though it still rotates at nominal velocity, no voltage is present in the generator's main terminal board):

-) When the generator is switched off, remove lid from the terminals case

-) Connect two connecting wires to a 12 Vdc battery with a 30Ω in-series resistance

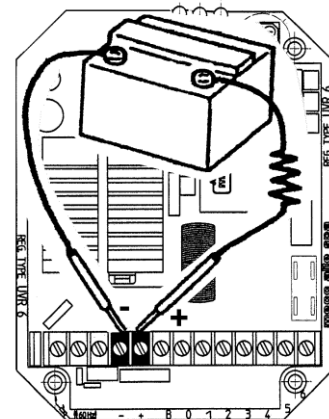


-) Follow the electrical diagrams supplied by Mecc Alte, to locate positive and negative terminals of electronic regulator

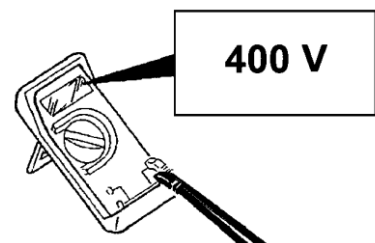


-) Start generator

-) Connect, only for a moment, the two connecting wires to the previously located terminals. Make sure to match polarities (positive terminal of regulator with positive terminal of battery, negative terminal of regulator with negative terminal of battery)



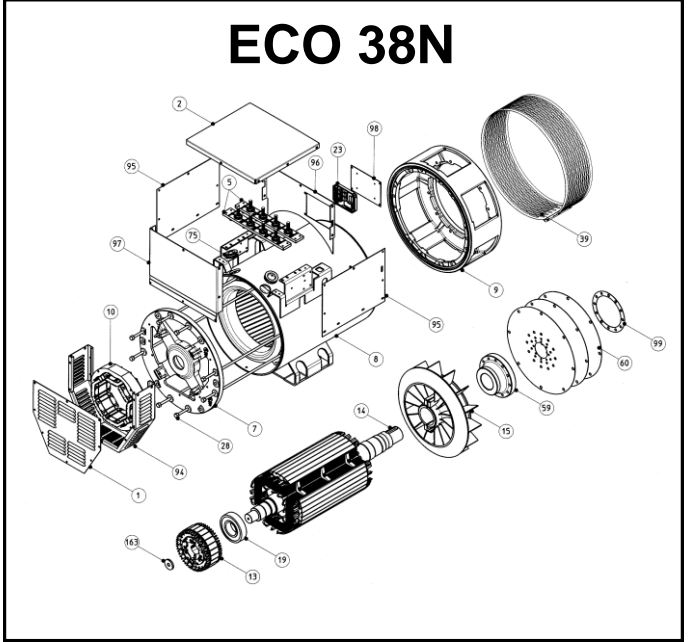
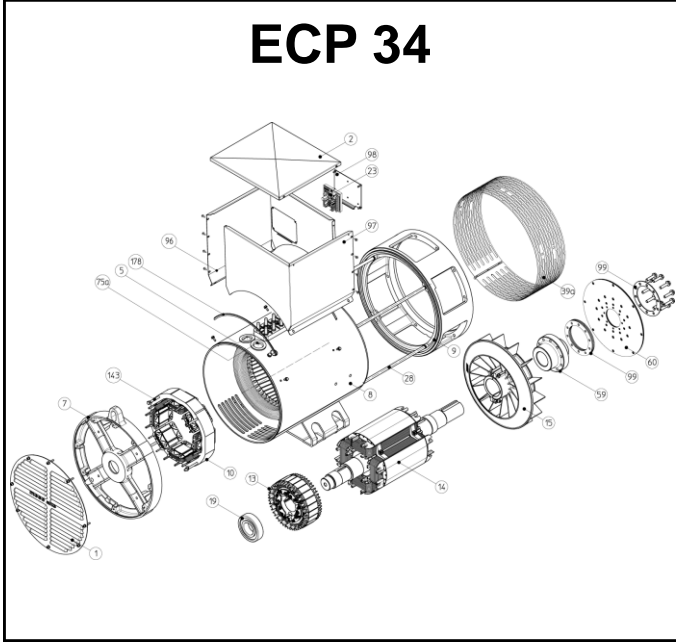
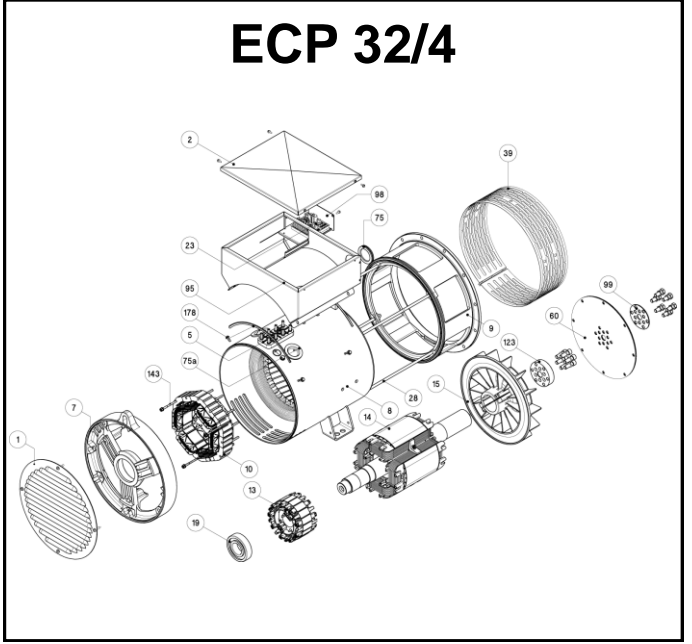
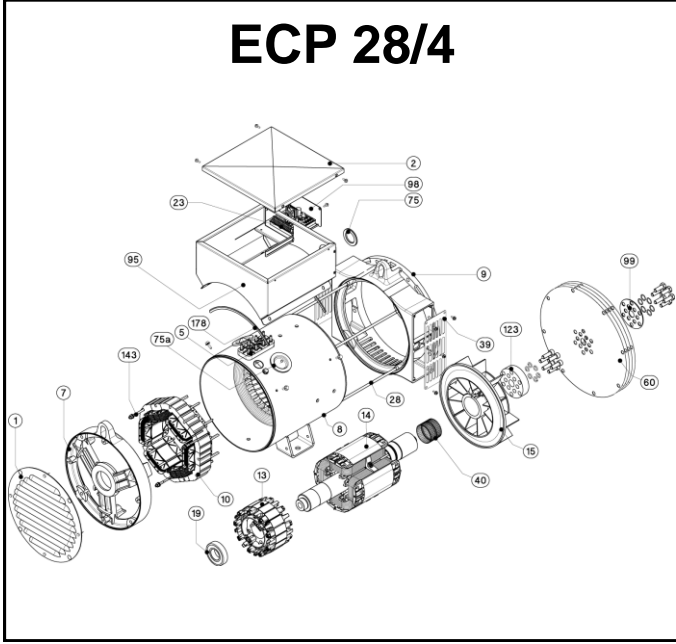
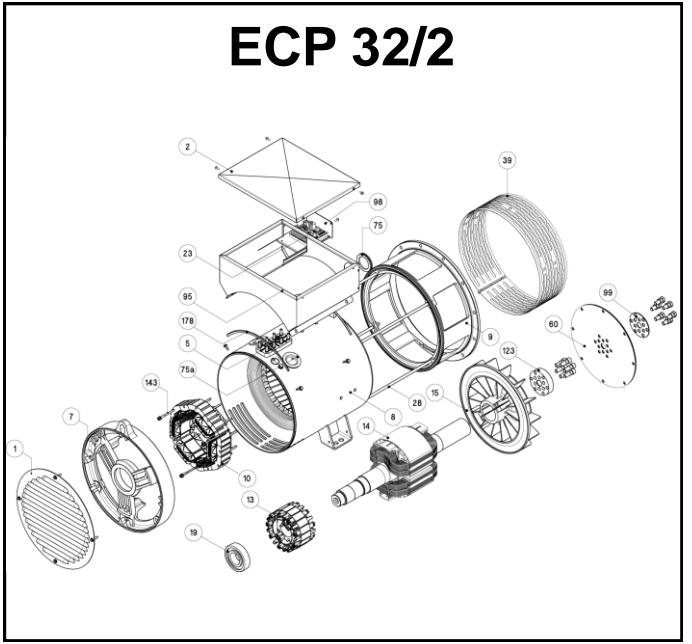
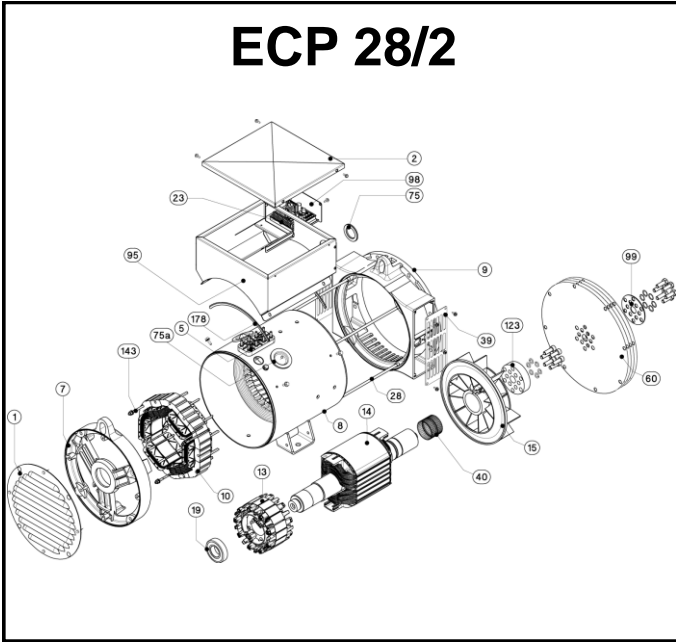
-) Use a voltmeter or the right instrument panel, to check whether the generator is producing the nominal voltage indicated on the plate.



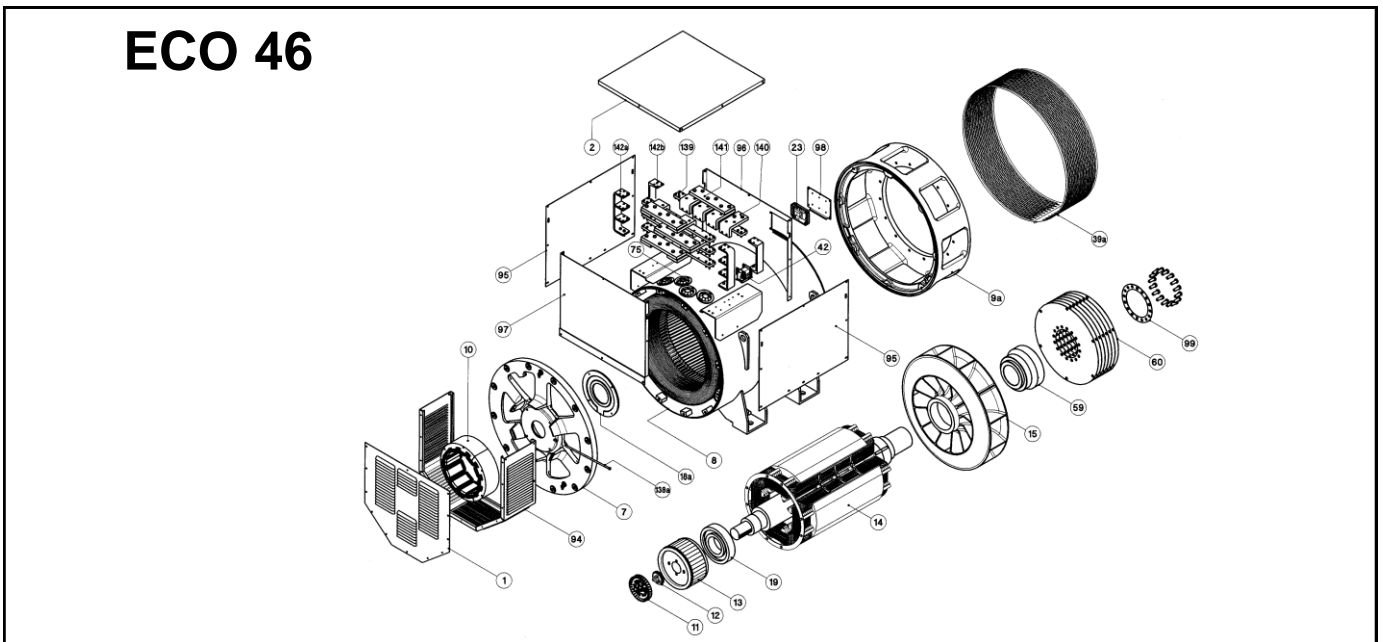
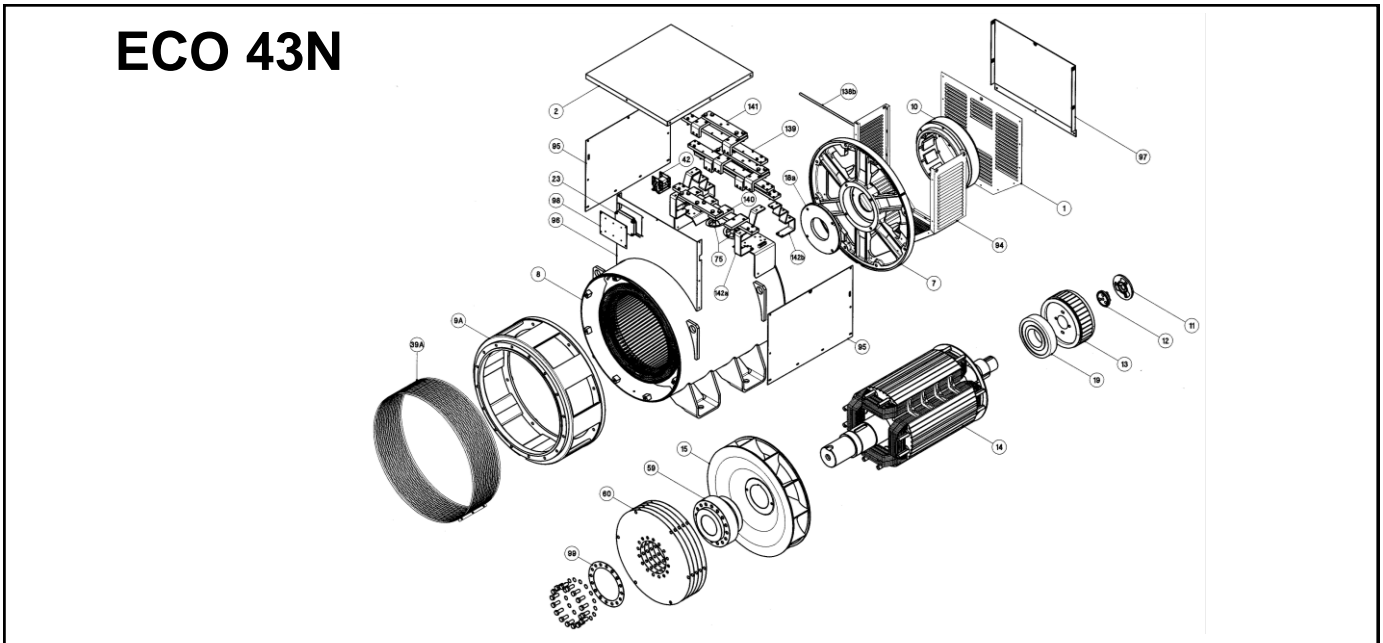
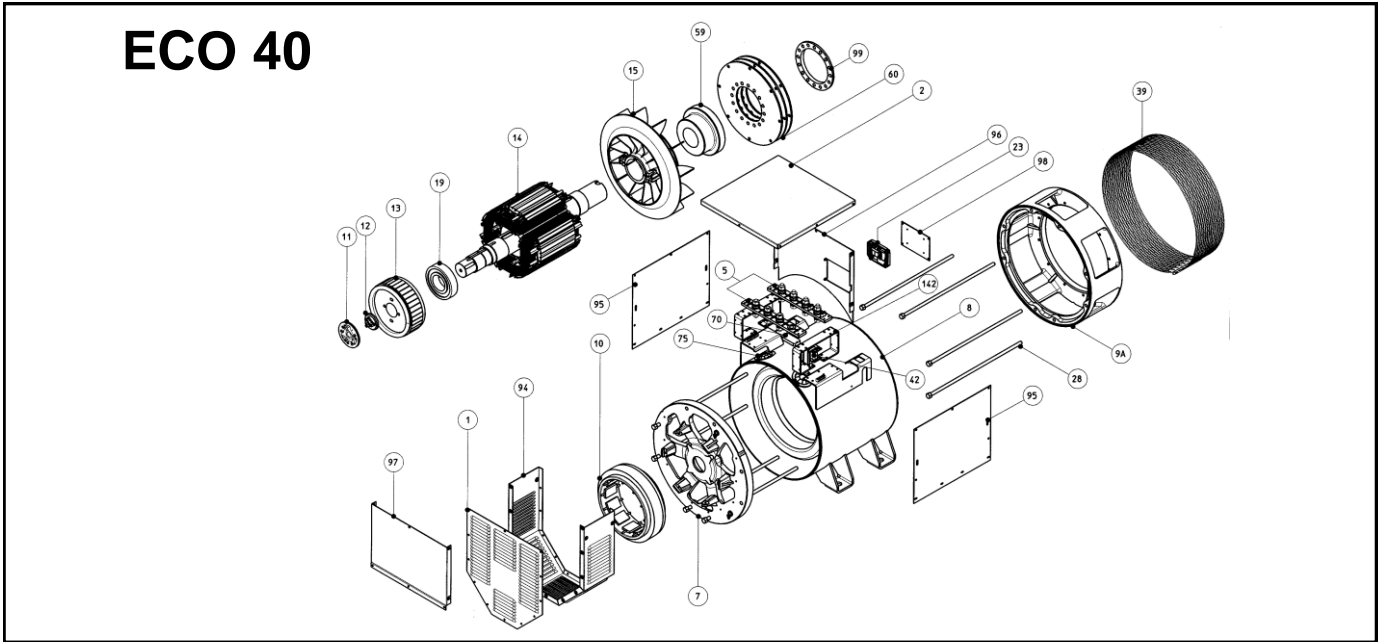
DEFECTS AND REMEDIES

<p>ALTERNATOR DOES NOT EXCITE</p> <ul style="list-style-type: none"> - Substitute fuse. - Increase speed by 15%. - For an instant apply on “+” and “-” of the electronic regulator a 12 V battery voltage with a 30 Ω resistor in series, respecting the polarities. 	
<p>AFTER BEING EXCITED ALTERNATOR DOES NOT EXCITE</p> <ul style="list-style-type: none"> - Check connection cables as per attached drawings. 	
<p>LOW VOLTAGE AT NO LOAD</p> <ul style="list-style-type: none"> - Reset voltage potentiometer. - Check speed. - Check windings. 	
<p>HIGH VOLTAGE AT NO LOAD</p> <ul style="list-style-type: none"> - Reset voltage potentiometer. - Substitute regulator. 	
<p>AT LOAD CONDITIONS, VOLTAGE LOWER THAN RATED VALUE</p> <ul style="list-style-type: none"> - Reset voltage potentiometer. - Current too high, power factor lower than 0.8, speed lower than 4% of rated speed. - Substitute regulator. - Check diodes, disconnect cables 	
<p>AT LOAD CONDITIONS, VOLTAGE HIGHER THAN RATED VOLTAGE</p> <ul style="list-style-type: none"> - Ritarare la tensione. - Sostituire il regolatore. 	
<p>UNSTABLE VOLTAGE</p> <ul style="list-style-type: none"> - Check uniformity of rotation. - Regulate stability of regulator by acting on “STAB” potentiometer. 	
<p>For any other defect, please contact the seller, the after sales service or Mecc Alte directly.</p>	

Exploded view and terminology



Exploded view and terminology



N.	NAME
1	real seal
2	casing
3	grid
5	users terminal board
7	rear cover
8	frame with stator
9	front cover
9A	front cover MD 35
10	exciting stator
11	rotating diode bridge
12	hub
13	exciting armature
14	rotor
15	fan
16	exterior flange bearing cover
17	drive end bearing
18	interior flange bearing cover
19	rear bearing
20	terminal box
22	diode holder washer
23	electronic regulator
24	auxiliary terminal board
28	cover stay bolt
39	protection screen
40	fixing ring
42	parallel device
59	coupling hub
60	disc plates
75	cable grommet
94	rear case
95	termin.brd.side panel
96	termin.brd.front panel
97	termin.brd.rear panel
98	regulator carrying panel
99	disc blocking ring-spacer
104	component-carryng panel
123	ring spacer
138a	front greasing pipe
138b	rear greasing pipe
139a	rear terminal strip
139b	front terminal strip
140	copper terminal
141	copper bridge
142	stirrups support
143	exciter stay bolt

Table 1

WINDING RESISTENCES AT 20 °C AMBIENT

4 POLE GENERATORS

TYPE	V / Hz	GENERATORS			EXCITER	
		STATOR 1-2	ROTOR	AUXILIARY WINDING	STATOR	ROTOR PHASE-PHASE
		Ω	Ω	Ω	Ω	Ω
ECP 28 1VS	115/200/230/400-50	0,951	0,911	3,753	10,60	0,417
ECP 28 2VS	115/200/230/400-50	0,582	1,032	3,225	10,60	0,417
ECP 28 0S	115/200/230/400-50	0,430	1,13	2,957	10,60	0,417
ECP 28 S	115/200/230/400-50	0,283	1,260	4,060	10,60	0,417
ECP 28 M	115/200/230/400-50	0,198	1,396	2,250	10,60	0,417
ECP 28 2L	115/200/230/400-50	0,128	1,670	2,150	10,60	0,417
ECP 28 VL	115/200/230/400-50	0,106	1,860	2,170	10,60	0,417
ECP 32 2S	115/200/230/400-50	0,097	2,010	1,098	10,60	0,417
ECP 32 3S	115/200/230/400-50	0,078	2,163	0,929	10,60	0,417
ECP 32 1L	115/200/230/400-50	0,061	2,473	0,993	11,35	0,442
ECP 32 2L	115/200/230/400-50	0,041	2,861	0,909	11,35	0,442
ECP 32 3L	115/200/230/400-50	0,035	3,171	0,790	11,35	0,442
ECP 34 1S	115/200/230/400-50	0,030	2,477	1,43	15,28	0,410
ECP 34 2S	115/200/230/400-50	0,020	2,951	1,35	15,28	0,410
ECP 34 1L	115/200/230/400-50	0,017	4,138	0,80	15,28	0,410
ECP 34 2L	115/200/230/400-50	0,015	3,577	1,05	15,28	0,410
ECP 34 3L	115/200/230/400-50	0,015	4,35	0,855	15,28	0,410
ECO 38 1SN	115/200/230/400-50	0,0130	3,905	0,854	15,28	0,685
ECO 38 2SN	115/200/230/400-50	0,0105	4,133	0,845	15,28	0,685
ECO 38 3SN	115/200/230/400-50	0,0085	4,449	0,778	15,28	0,685
ECO 38 1LN	115/200/230/400-50	0,0065	4,887	0,796	15,28	0,685
ECO 38 2LN	115/200/230/400-50	0,0055	5,604	0,751	15,28	0,685
ECO 38 3LN	115/200/230/400-50	0,0042	6,780	0,700	15,28	0,685
ECO 40 1S	230/400/460/800-50	0,0180	4,488	0,558	8,85	0,317
ECO 40 2S	230/400/460/800-50	0,0130	4,881	0,521	8,85	0,317
ECO 40 3S	230/400/460/800-50	0,0106	5,176	0,540	8,85	0,317
ECO 40 1L	230/400/460/800-50	0,0100	6,025	0,476	8,85	0,317
ECO 40 1.5L	230/400/460/800-50	0,0087	1,376	0,550	8,85	0,050
ECO 40 2L	230/400/460/800-50	0,0130	1,500	0,481	8,85	0,050
ECO 40 VL	230/400/460/800-50	0,0104	1,592	0,300	8,85	0,050
ECO 43 1SN	230/400/460/800-50	0,0109	2,100	0,440	10,63	0,130
ECO 43 2SN	230/400/460/800-50	0,0086	2,300	0,413	10,63	0,130
ECO 43 1LN	230/400/460/800-50	0,0078	2,500	0,713	10,63	0,130
ECO 43 2LN	230/400/460/800-50	0,0058	2,800	0,677	10,63	0,130
ECO 43 VL	230/400/460/800-50	0,0046	2,886	0,40	10,63	0,130
ECO 46 1S	230/400/460/800-50	0,0057	3,050	0,414	12,90	0,120
ECO 46 1.5S	230/400/460/800-50	0,0034	3,319	0,35	12,90	0,120
ECO 46 2S	230/400/460/800-50	0,0039	3,500	0,330	12,90	0,120
ECO 46 1L	230/400/460/800-50	0,0032	3,977	0,360	12,90	0,120
ECO 46 1.5L	230/400/460/800-50	0,0027	4,27	0,40	12,90	0,120
ECO 46 2L	230/400/460/800-50	0,0024	4,500	0,390	12,90	0,120

2 POLE GENERATORS

ECP 28 M	115/200/230/400-50	0,1480	4,877	2,706	10,60	0,417
ECP 28 2L	115/200/230/400-50	0,0863	5,523	1,173	10,60	0,417
ECP 28 3L	115/200/230/400-50	0,0860	5,848	1,087	10,60	0,417
ECP 28 VL	115/200/230/400-50	0,056	6,500	0,690	10,60	0,417
ECP 32 2S	115/200/230/400-50	0,110	3,650	1,553	10,60	0,417
ECP 32 3S	115/200/230/400-50	0,046	4,071	1,403	10,60	0,417
ECP 32 1L	115/200/230/400-50	0,043	4,301	1,358	11,35	0,475
ECP 32 2L	115/200/230/400-50	0,034	4,680	1,141	11,35	0,475



Table 2 CONNECTIONS ALTERNATORS

TRIANGOLO DELTA
DREIECK-SCHALTUNG
TRIANGULO

GENERATORI A 6 MORSETTI
6 LEAD ALTERNATORS
ALTERNATEURS 6 FILS
GENERATOREN MIT 6 WICKLUNSENDEN
ALTERNADOR DE 6 HILOS

STELLA STAR
ETOILE
STERN-SCHALTUNG
ESTRELLA

SERIE STELLA
SERIES STAR
SERN-REIHEN-SCHALTUNG
SERIE ESTRELLA

PARALLELO STELLA
PARALLEL STAR
PARALLELE ETOILE
STERN-PARALLEL-SCHALTUNG
PARALELO ESTRELLA

SERIE TRIANGOLO
SERIES DELTA
SERIE TRIANGLE
DREIECK-REIHEN-SCHALTUNG
SERIE TRIANGULO

PARALLELO TRIANGOLO
PARALLEL DELTA
PARALLELE TRIANGLE
DREIECK-PARALLEL-SCHALTUNG
PARALELO TRIANGULO

ZIG-ZAG TRIFASE
THREE-PHASE ZIG-ZAG
ZIG-ZAG TRIFASE
DREIFASIGEN ZIG-ZAG
SCHALTUNG
ZIG-ZAG TRIFASICA

MONOFASE PARALLELO ZIG-ZAG
SINGLE PHASE PARALLEL ZIG-ZAG
MONOPHASE PARALLELE ZIG-ZAG
EINPHASIGEN ZIG-ZAG PARALLEL
SCHALTUNG
MONOFASE PARALELO ZIG-ZAG

DOBPIO TRIANGOLO
DOUBLE DELTA
DOUBLE TRIANGLE
DOPPEL-DREIECK
SCHALTUNG
DOBLE TRIANGULO

Table 3

S.R.7/2-G

REG. TYPE SR7

1 CONNETTERE ASSIEME PER ALIMENTAZIONE A 110V.
 2 CONNECT TOGETHER FOR 110V FEEDING.
 3A
 4
 4A FASE PHASE
 5 RIFERIMENTO SENSING
 6 CONNETTERE ASSIEME PER IL FUNZIONAMENTO 60 HZ.
 7 CONNECT TOGETHER FOR 60 HZ. FUNCTION.
 8 POT. ESTERNO EXTERNAL POT.
 9 100 K
 10 5B
 11 5C

A4833/00

U.V.R.6/1-F

REG. TYPE UVR

6 ALIMENTAZIONE E RIFERIMENTO
 5 VEDERE SCHEMI DI COLLEGAMENTO
 4 SENSING AND FEEDING
 3 VEE DRAWINGS CONNECTING
 2 ALIMENTATION ET REFERENCE
 1 (VOR SCHEMA DE BRANCHEMENT)

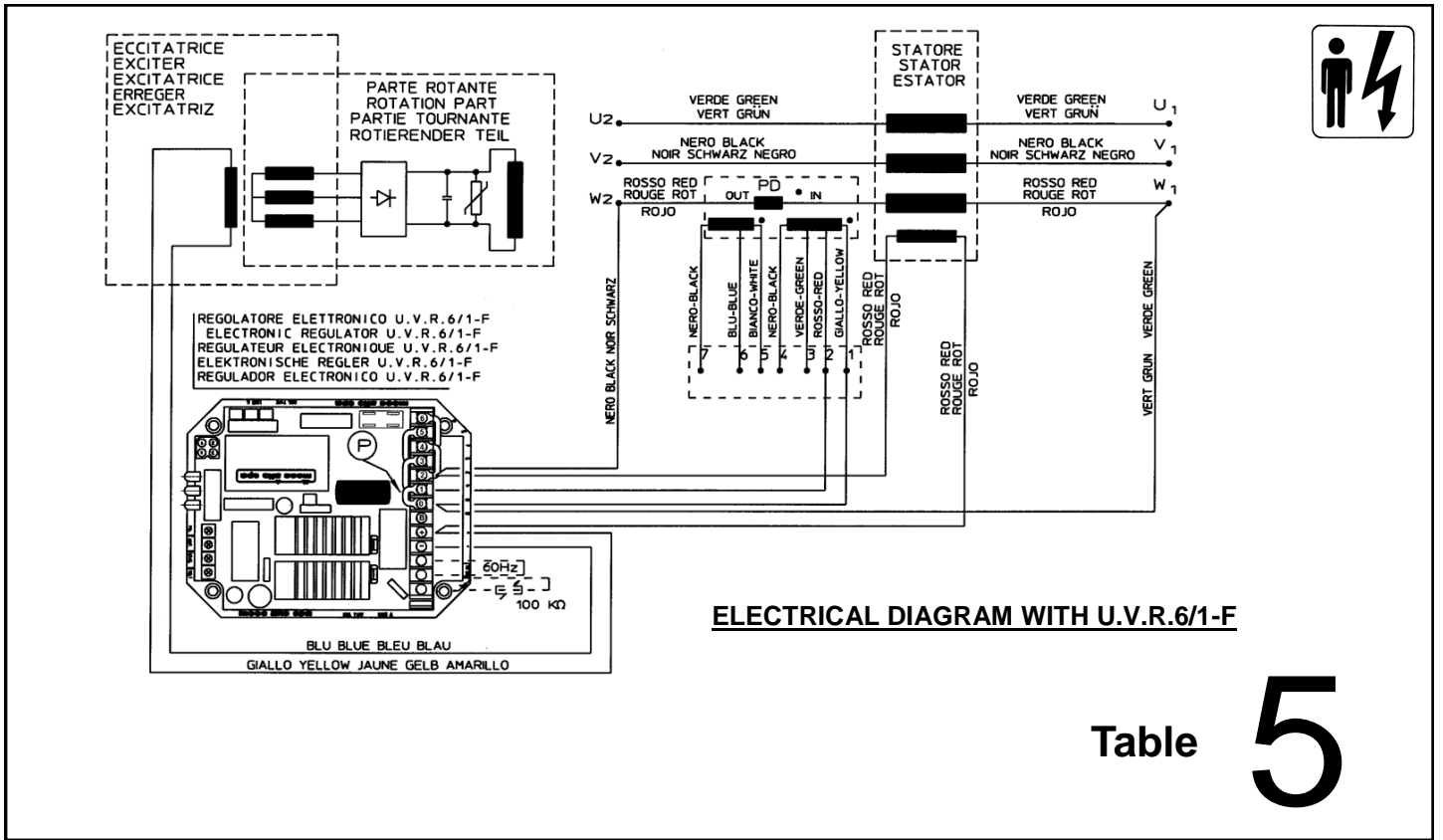
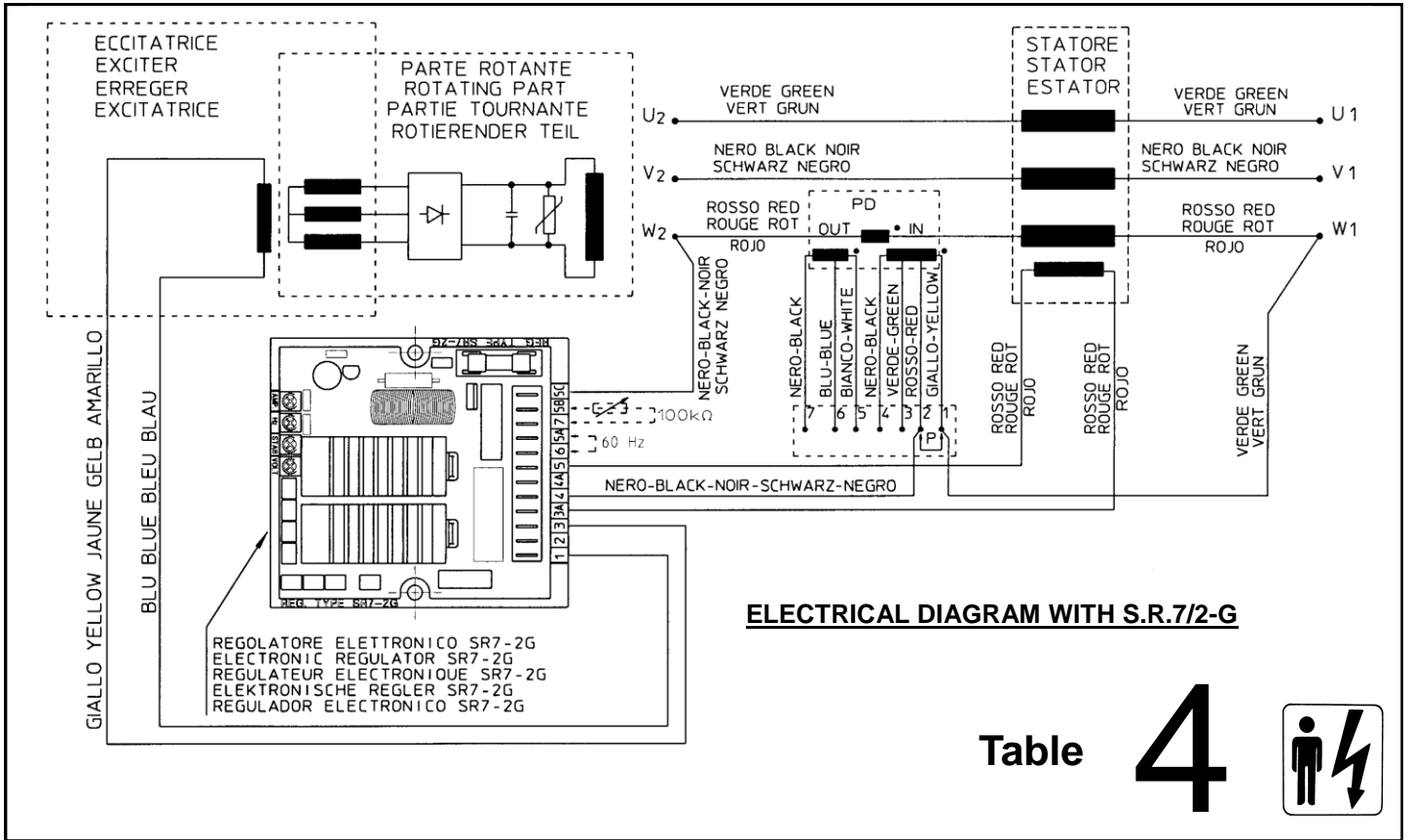
6B PONTICELLARE SOLO PER ALIMENTAZIONE: NON CONNETTERE INSIEME PER FEEDING: POWER SENSING POUR ALIMENTATION: NON ECGITAZIONE - EXCITER - EXCITATRICE.
 6C PONTICELLARE SOLO PER FUNZIONAMENTO 60HZ: CONNETTERE INSIEME PER FEEDING: 60 HZ. FUNCTION: POWER SENSING POUR FONCTIONEMENT 60 HZ.
 7 POT. ESTERNO TENSIONE A DISTANZA 100 KΩ
 8 POTENTIOMETRE DE TENSION A DISTANCE 100 KΩ

LED GIALLO - SOMMARCAPPO
 YELLOW LED - OVERLOAD
 LED VERDE - SURCHARGE

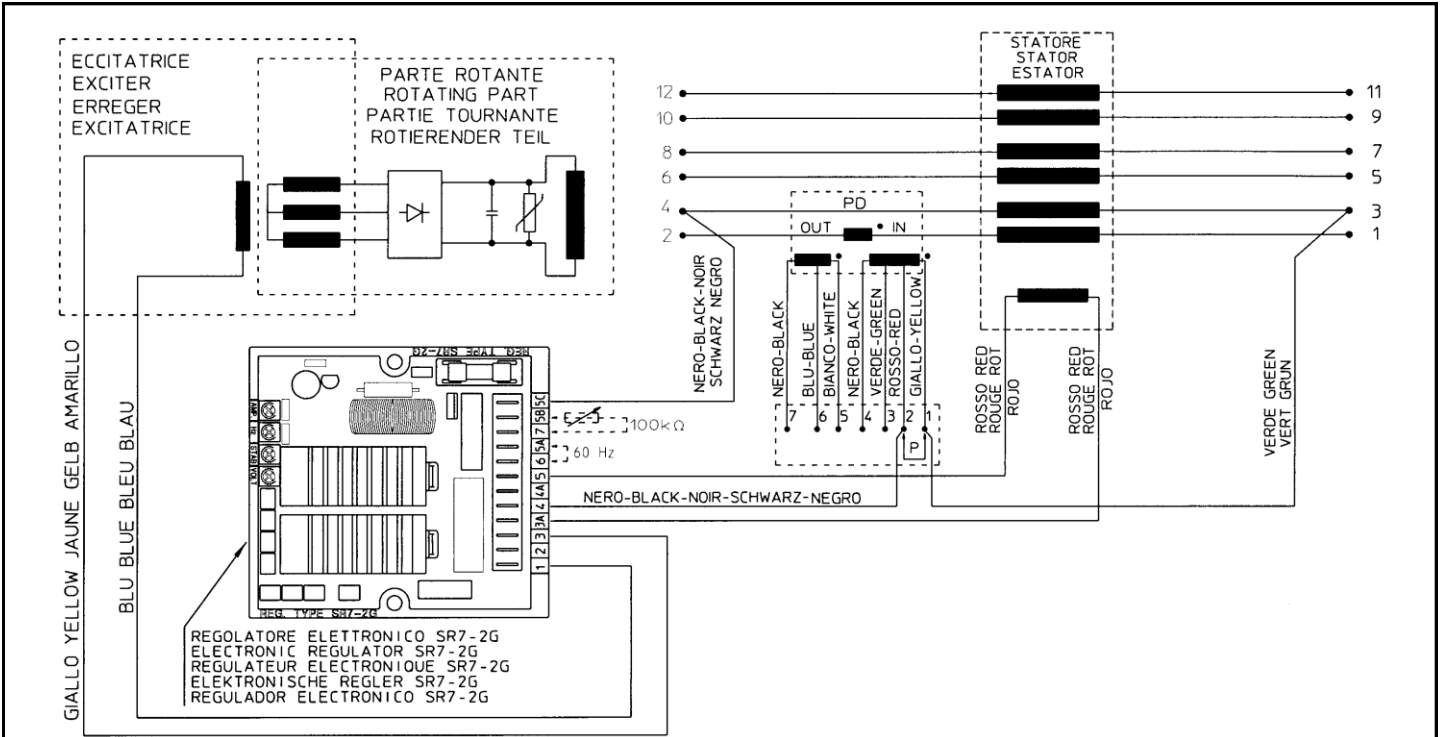
SCHEMI DI COLLEGAMENTO - DRAWINGS CONNECTIONS
 SCHEMAS DE BRANCHEMENT
 REGOLAZIONE TRIFASE
 THREE PHASE REGULATION
 REGULATION TRIPHASE
 REGULATION MONOPHASE

REGOLAZIONE DIRETTA DELLA TENSIONE IN USCITA 1 TO L SENSING
 REGULATOR DIRECTE DE LA TENSION DE SORTIE

LED ROSSO - BASSA VELOCITÀ
 RED LED - UNDERFREQ
 LED VERDE - EN REGULATION
 LED ROUGE - SOUSFREQUENCE

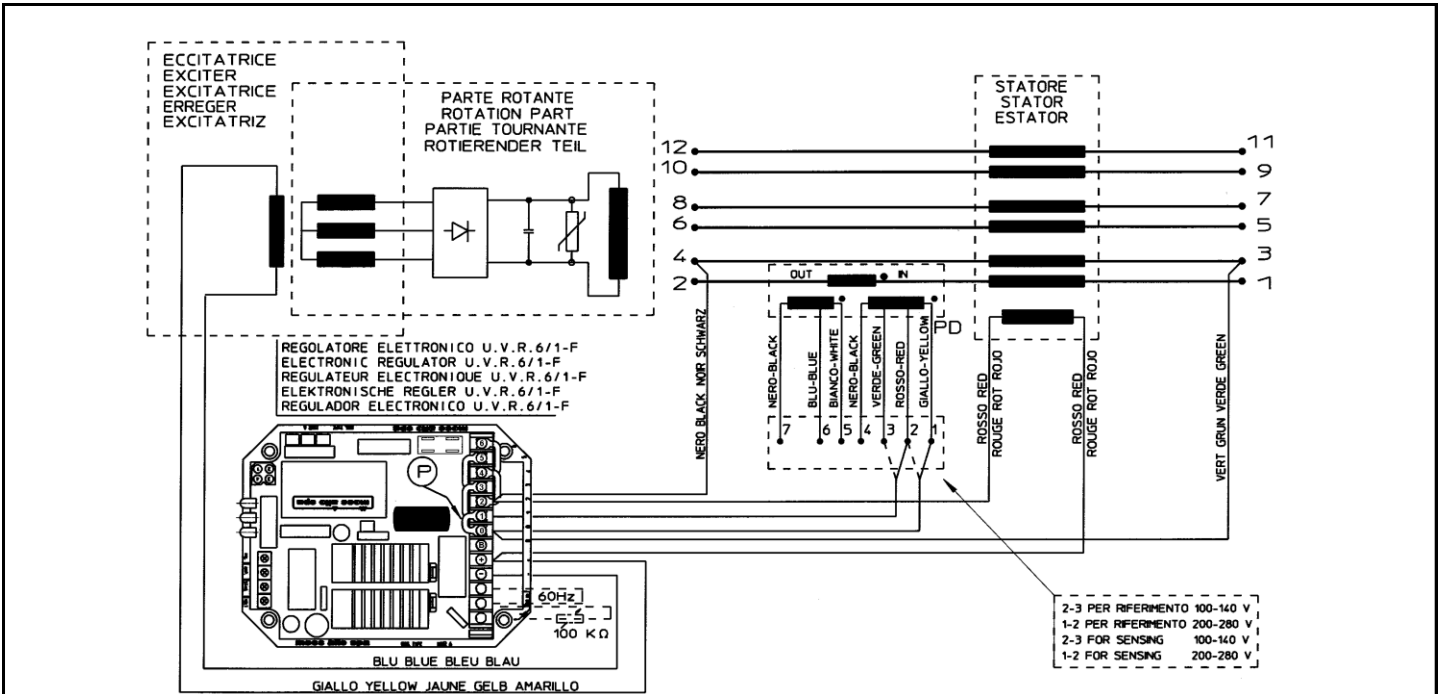


Note: The parallel device PD is optional up to 350 kVA. The link P activates or deactivates the parallel device, if it is present.



12 WIRES ELECTRICAL DIAGRAM WITH S.R.7/2-G

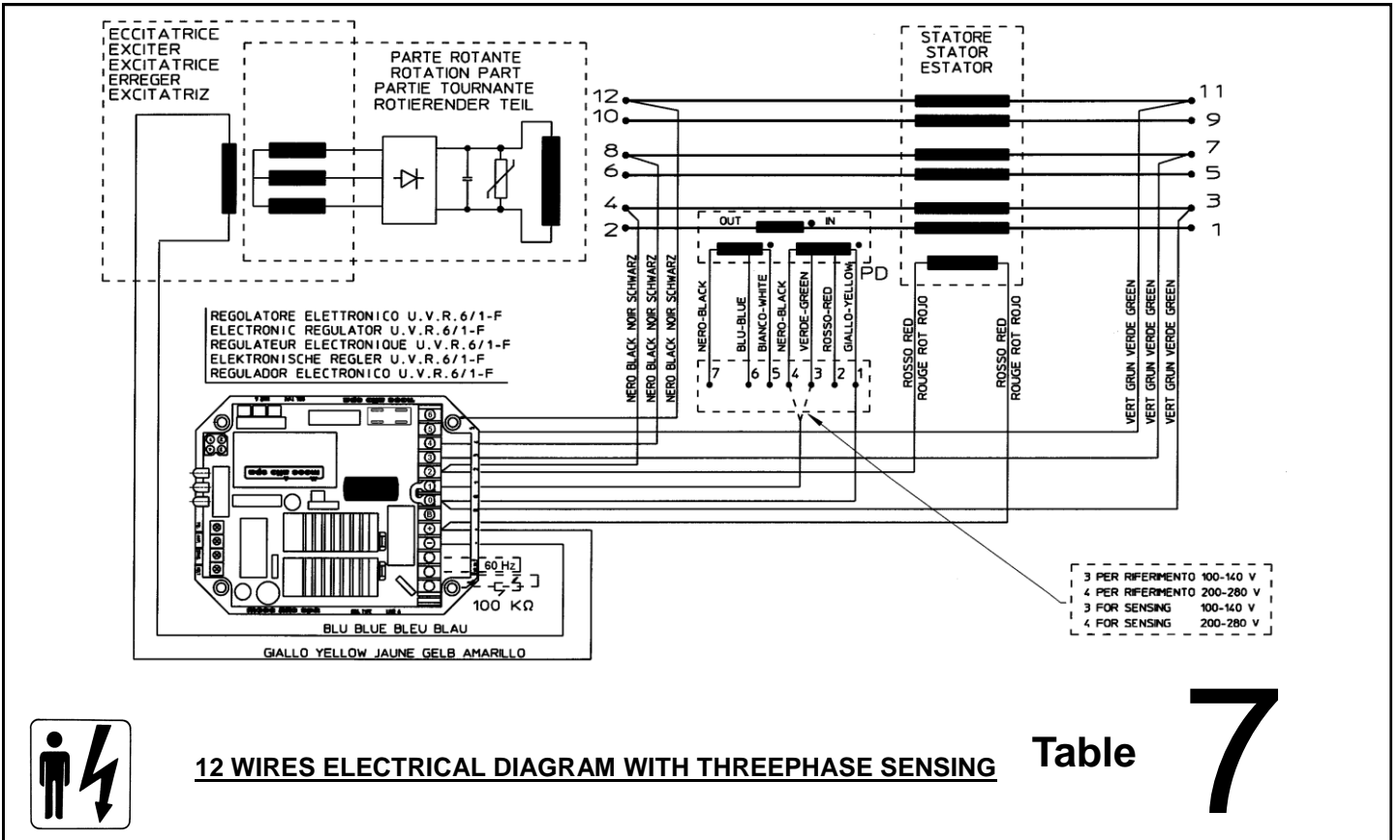
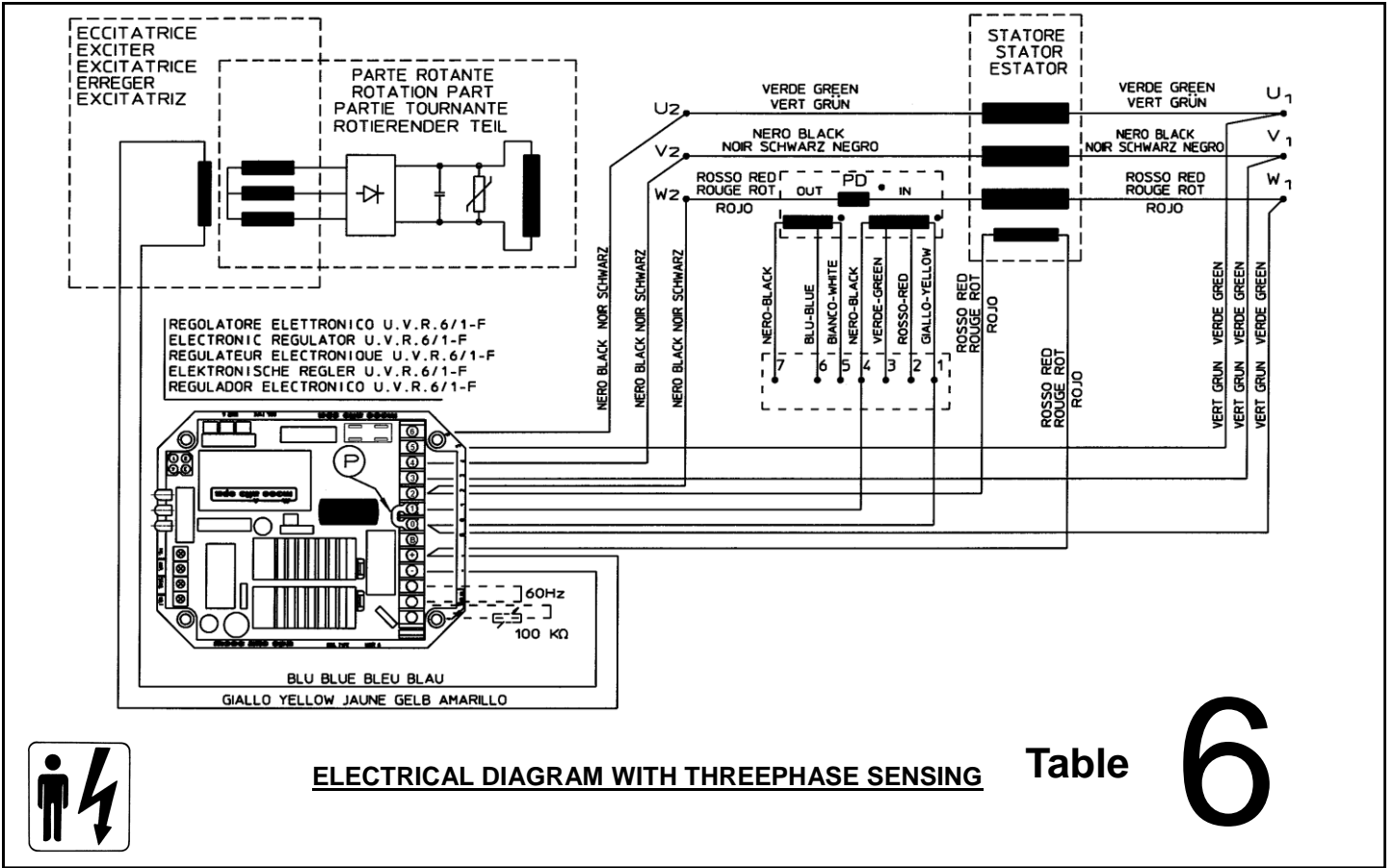
Table **4A**



12 WIRES ELECTRICAL DIAGRAM WITH U.V.R.6/1-F

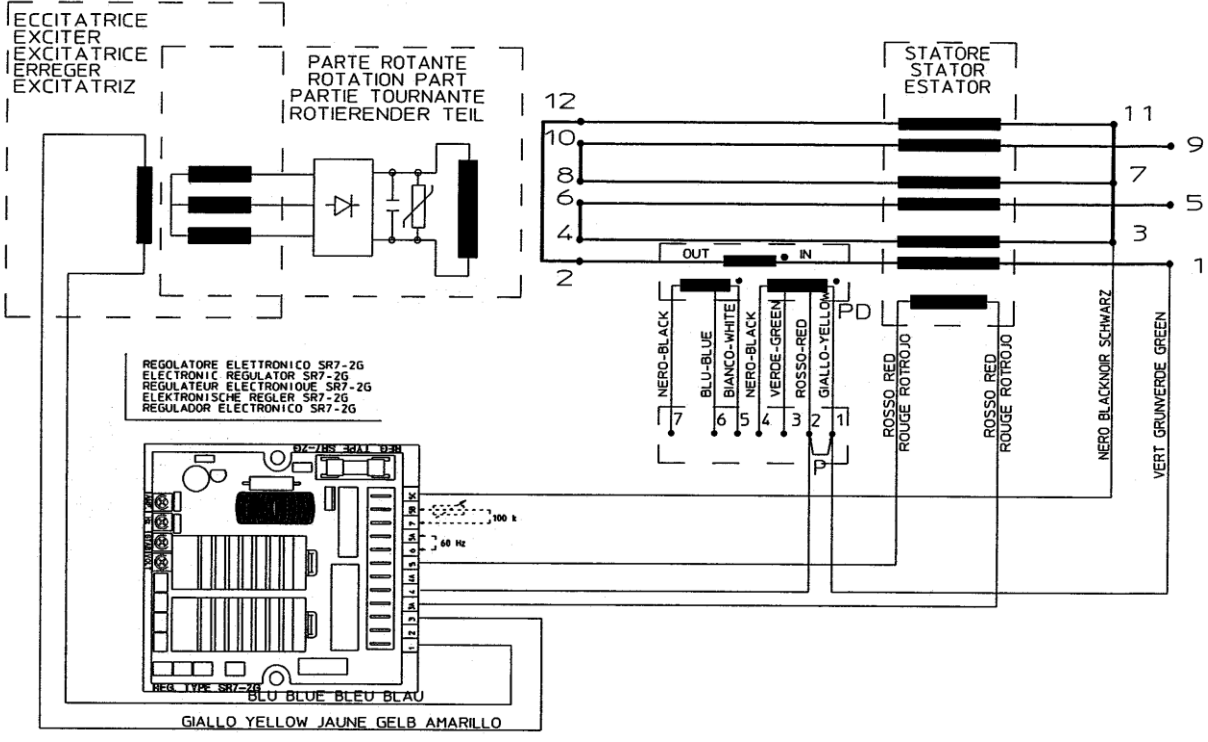
Table **5A**





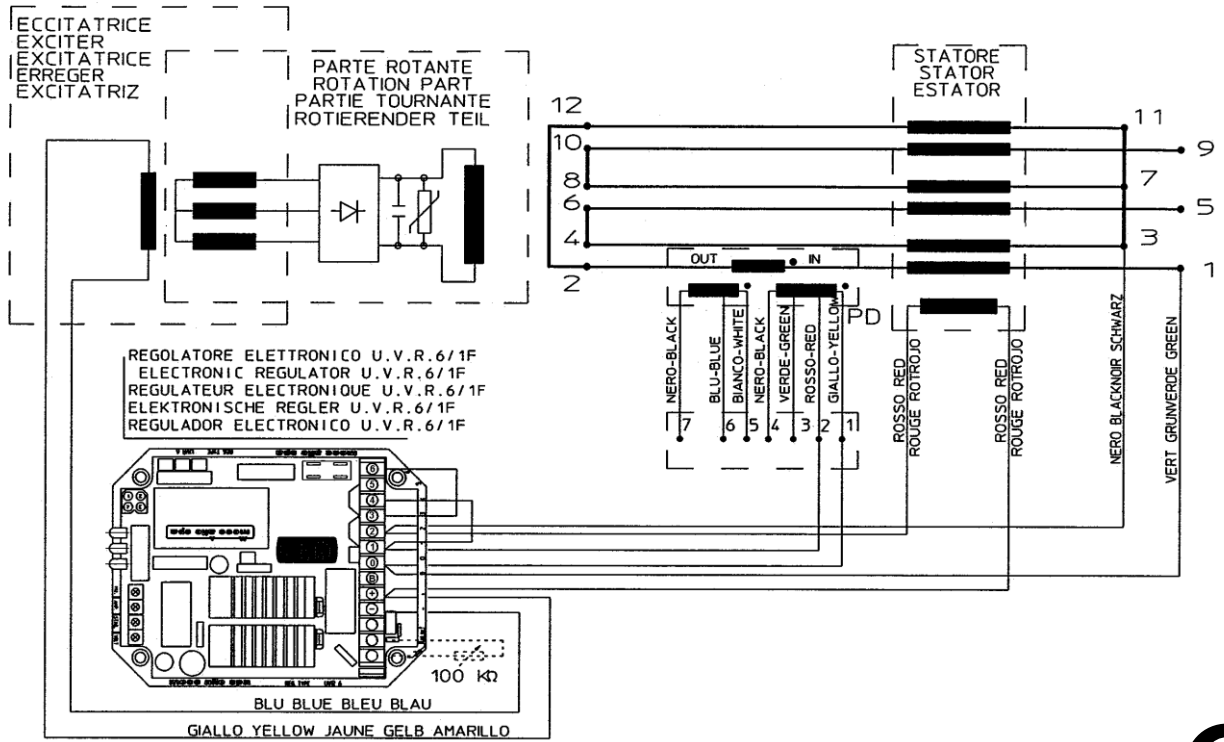
Note: The parallel device PD is optional up to 350 kVA.
 The link P activates or deactivates the parallel device, if it is present.





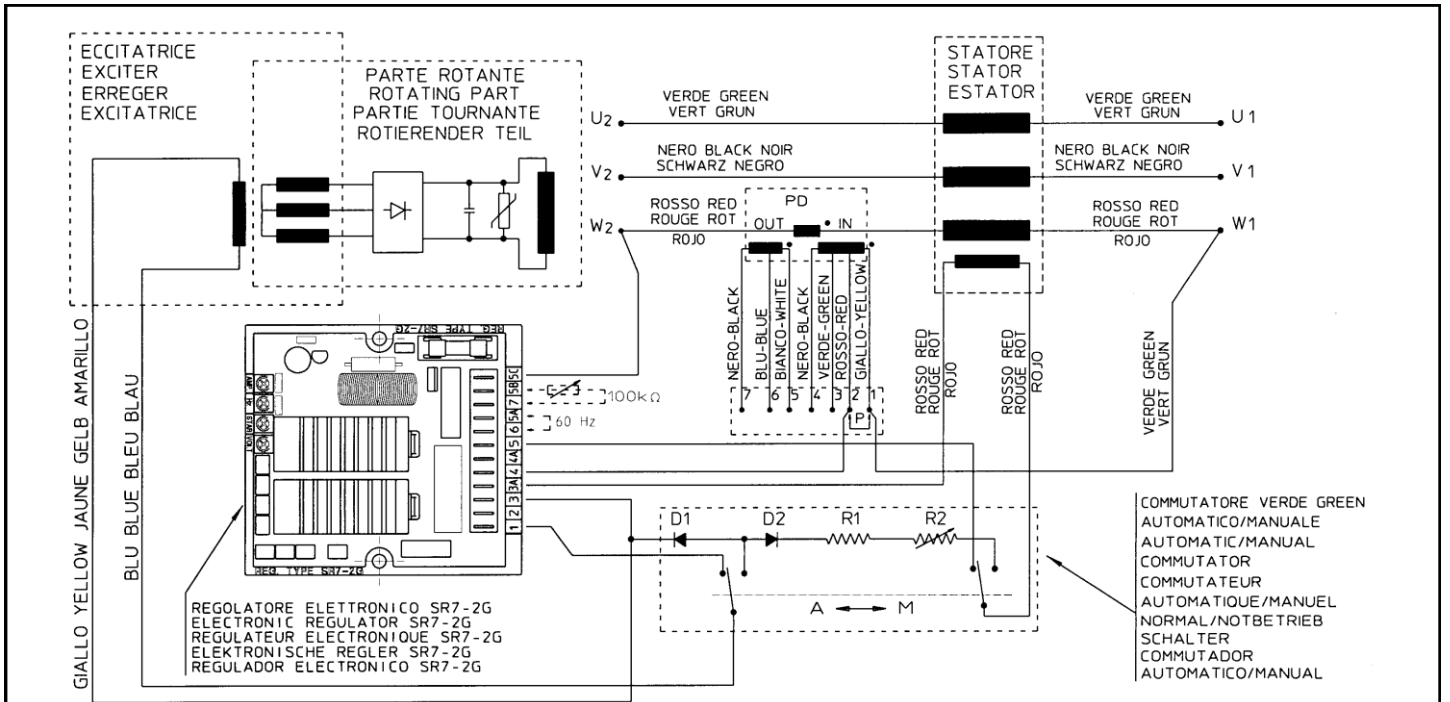
12 WIRES ELECTRICAL DIAGRAM WITH S.R.7/2-G (ZIG-ZAG)

Table 8



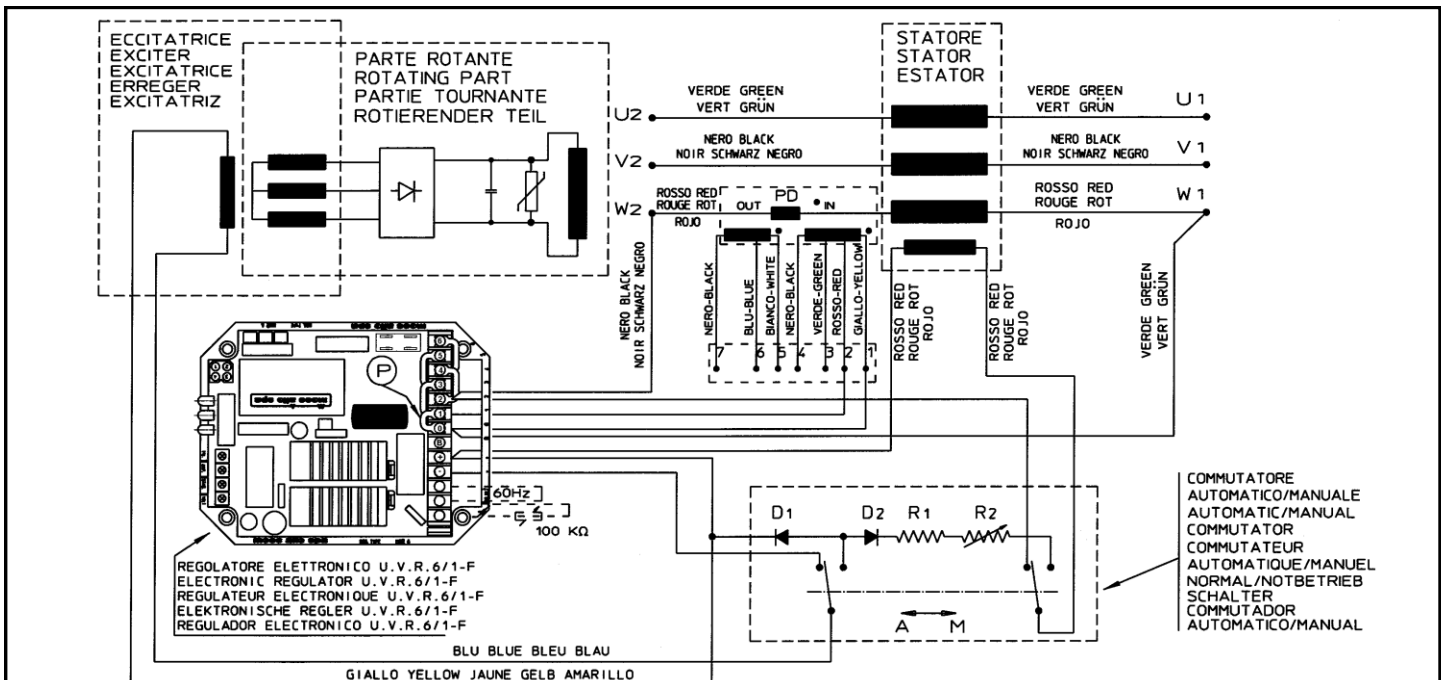
12 WIRES ELECTRICAL DIAGRAM WITH U.V.R.6/1-F (ZIG-ZAG)

Table 9



AUTOMATIC/MANUAL COMMAND WITH S.R.72-G REGULATOR

Table **10**



AUTOMATIC/MANUAL COMMAND WITH U.V.R.6/1-F REGULATOR

Table **11**

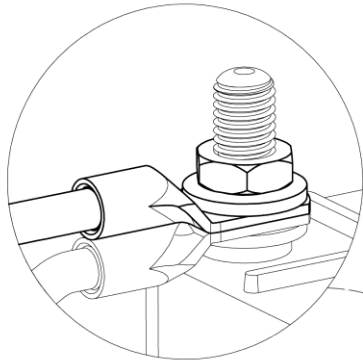


Note: The parallel device PD is optional up to 350 kVA.
The link P activates or deactivates the parallel device, if it is present.



Table **12**

USER CABLES CONNECTION 28-32-34



CAVI UTILIZZATORE
 USER CABLES
 UTILISATEUR CABLE
 KABEL BENUTZER
 CABLE DE USUARIO

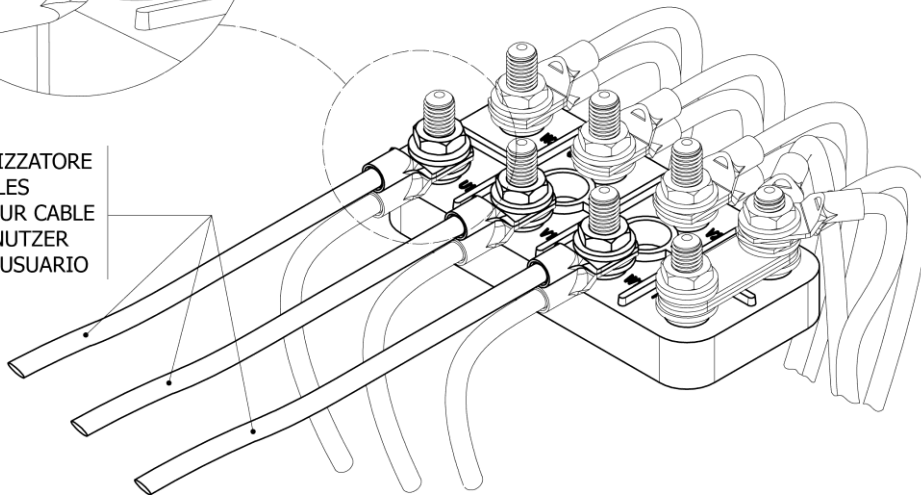
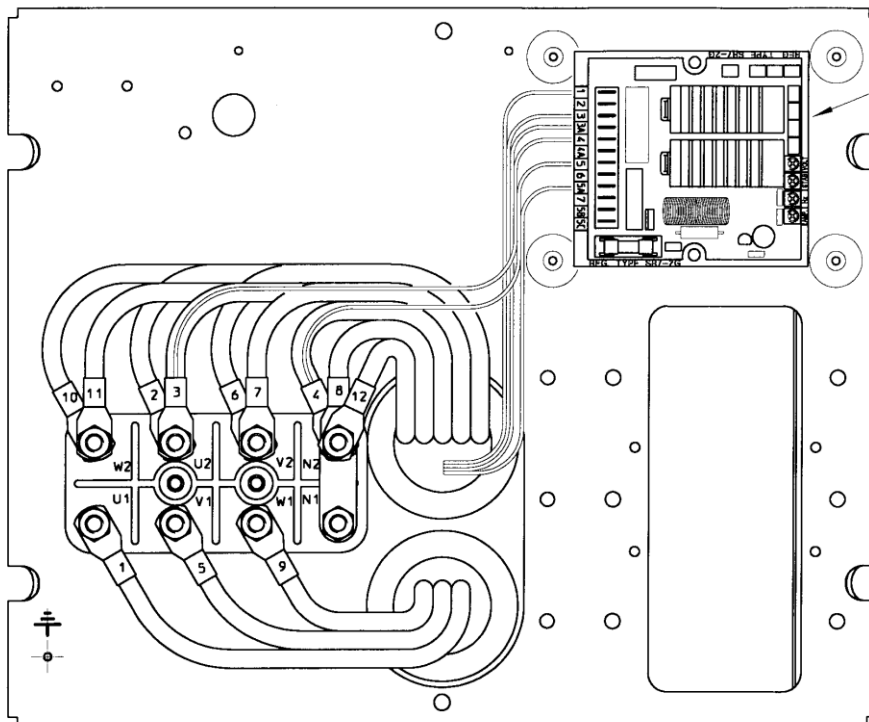


Table **13**

TERMINAL BOX 28-32



REGOLATORE ELETTRONICO SR7-2G
 ELECTRONIC REGULATOR SR7-2G
 REGULATEUR ELECTRONIQUE SR7-2G
 ELEKTRONISCHE REGLER SR7-2G
 REGULADOR ELECTRONICO SR7-2G

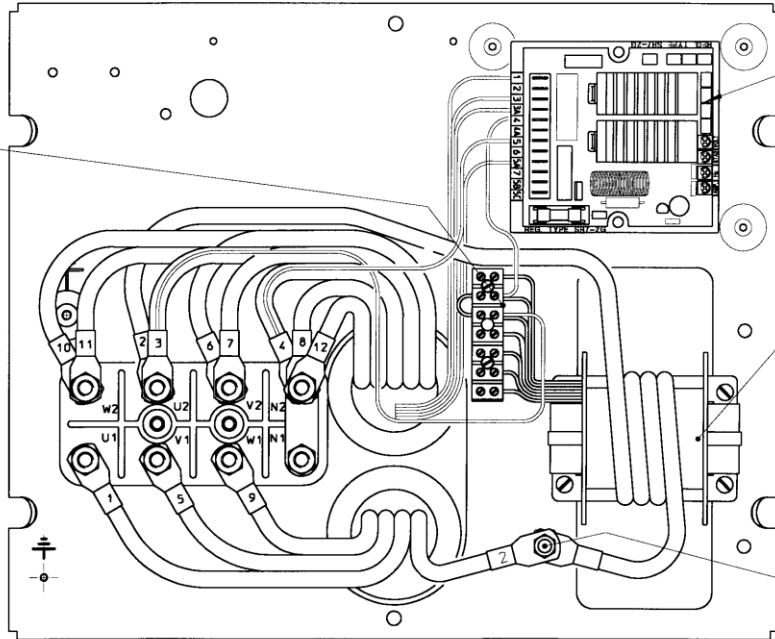
Series star connection

Table 14

TERMINAL BOX 28-32 WITH PARALLEL DEVICE



RIMUOVERE IL PONTICELLO PER ABILITARE IL DISPOSITIVO DI PARALLELO
 REMOVE THE LINK BRIDGE TO OPERATE THE PARALLEL DEVICE
 ENLEVER LE PETIT PONT POUR LE FONCTIONNEMENT DU DISPOSITIF DE PARALLELE
 BRUKE BEI PARALLEL BETRIEB ENTFERNENT DESMONTAR EL PUENTICILLO PARA HABILITAR EL DISPOSITIVO DE PARALLELO



REGOLATORE ELETTRONICO SR7-2G
 ELECTRONIC REGULATOR SR7-2G
 REGULATEUR ELECTRONIQUE SR7-2G
 ELEKTRONISCHE REGLER SR7-2G
 REGULADOR ELECTRONICO SR7-2G

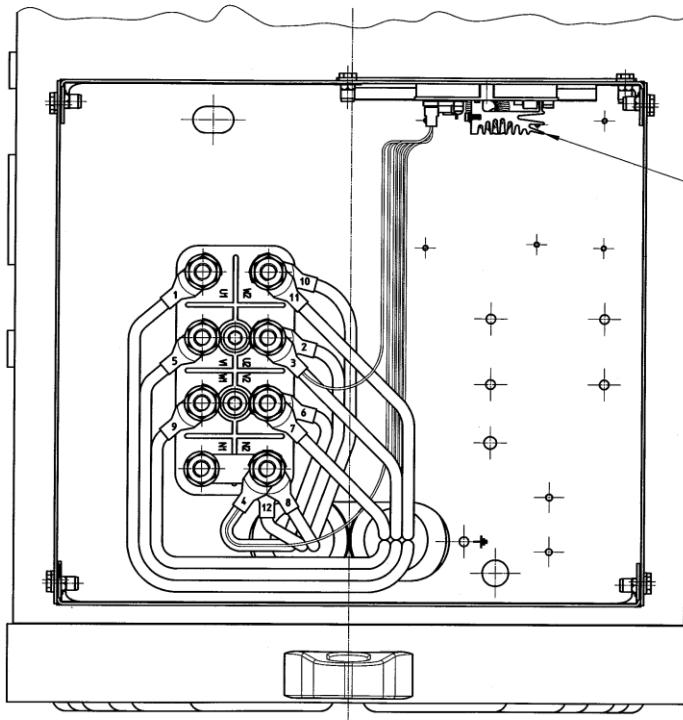
DISPOSITIVO DI PARALLELO
 PARALLEL DEVICE
 DISPOSITIF DE PARALLELE
 STATIKWANDLER
 DISPOSITIVO DE PARALLELO

ISOLATORE
 INSULATOR
 ISOLATEUR
 ISOLATOR
 AISLADOR

Series star connection

Table 15

TERMINAL BOX 34

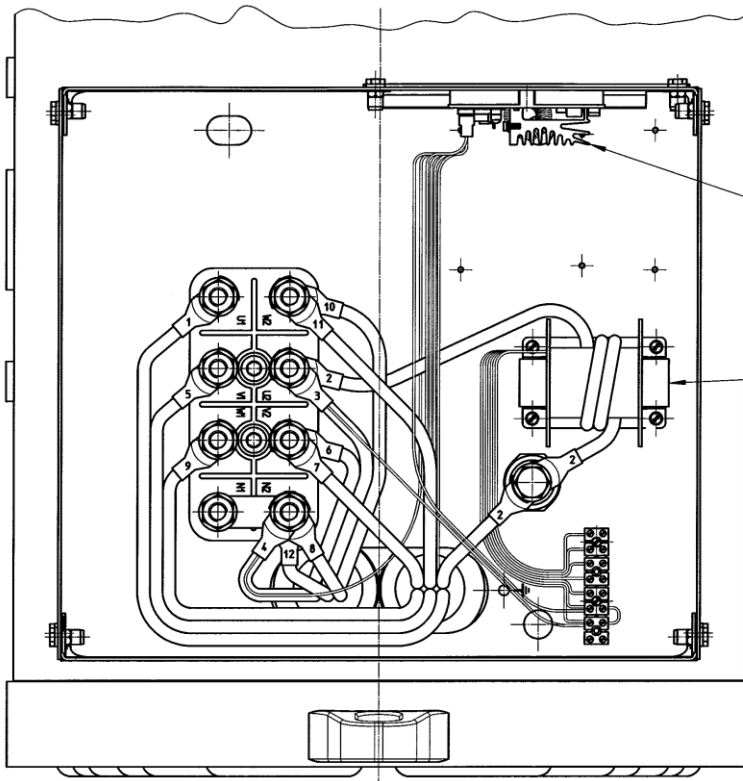


REGOLATORE ELETTRONICO SR7-2G
 ELECTRONIC REGULATOR SR7-2G
 REGULATEUR ELECTRONIQUE SR7-2G
 ELEKTRONISCHE REGLER SR7-2G
 REGULADOR ELECTRONICO SR7-2G

Series star connection

Table 16

TERMINAL BOX 34 WITH PARALLEL DEVICE



REGOLATORE ELETTRONICO SR7-2G
ELECTRONIC REGULATOR SR7-2G
REGULATEUR ELECTRONIQUE SR7-2G
ELEKTRONISCHE REGLER SR7-2G
REGULADOR ELECTRONICO SR7-2G

DISPOSITIVO DI PARALLELO
PARALLEL DEVICE
DISPOSITIF DE PARALLELE
STATIKWANDLER
DISPOSITIVO DE PARALELO

Series star connection

Table 17

USER CABLES CONNECTION 38-40

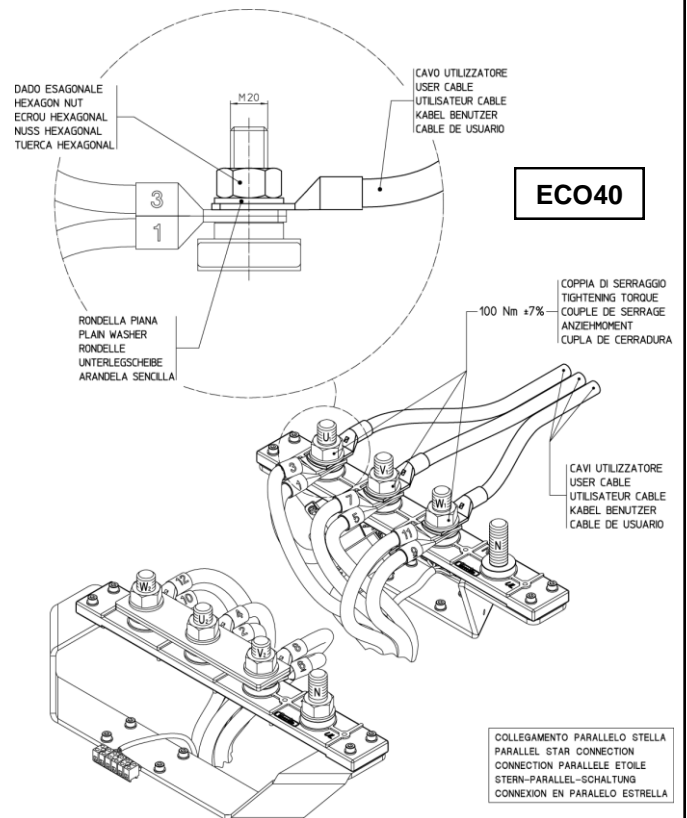
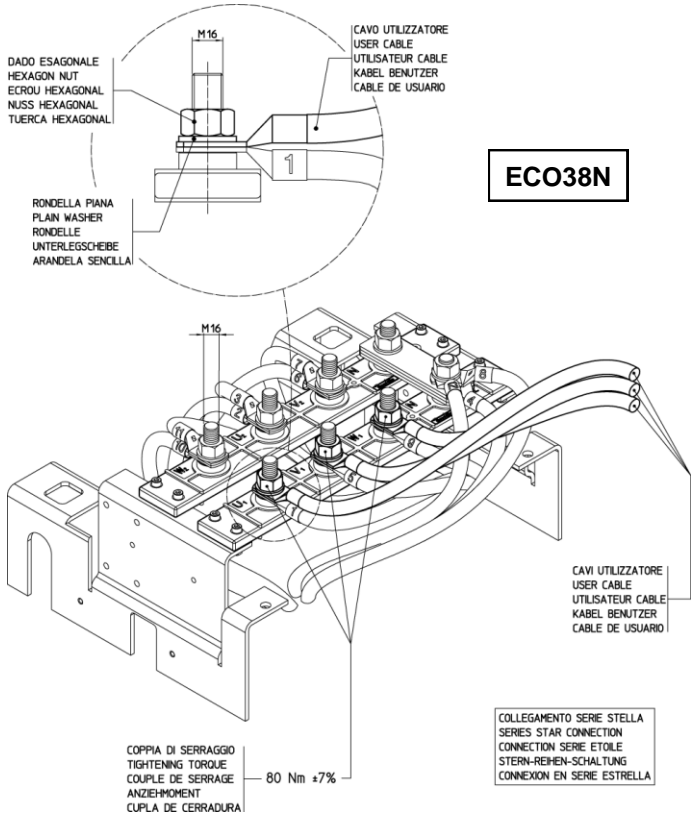
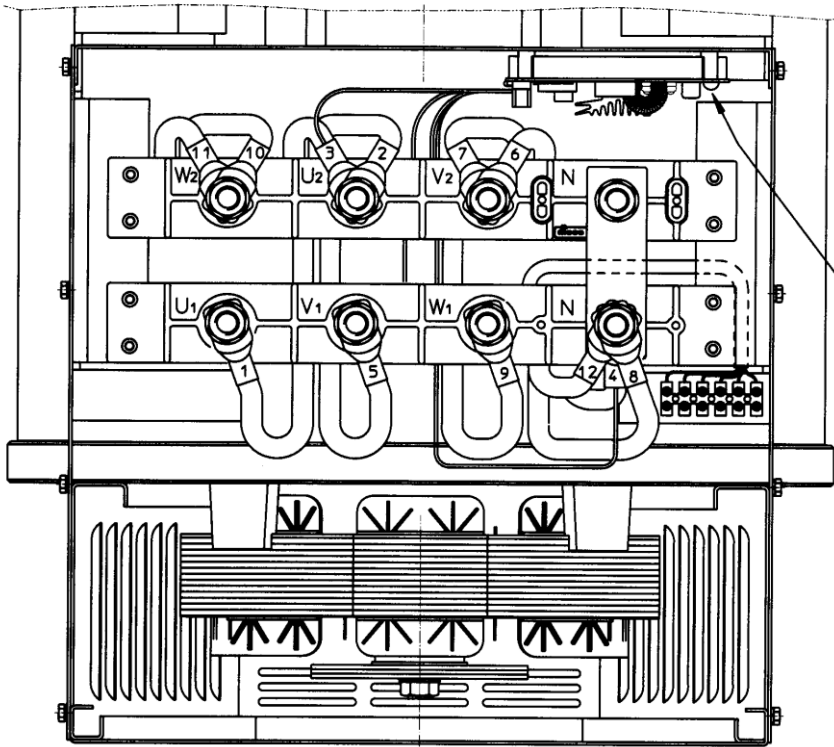


Table **18**

TERMINAL BOX 38



REGOLATORE ELETTRONICO U.V.R.6/1-F
 ELECTRONIC REGULATOR U.V.R.6/1-F
 REGULATEUR ELECTRONIQUE U.V.R.6/1-F
 ELEKTRONISCHER REGLER U.V.R.6/1-F
 REGULADOR ELECTRONICO U.V.R.6/1-F

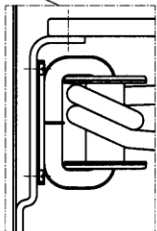
Series star connection

Table **19**

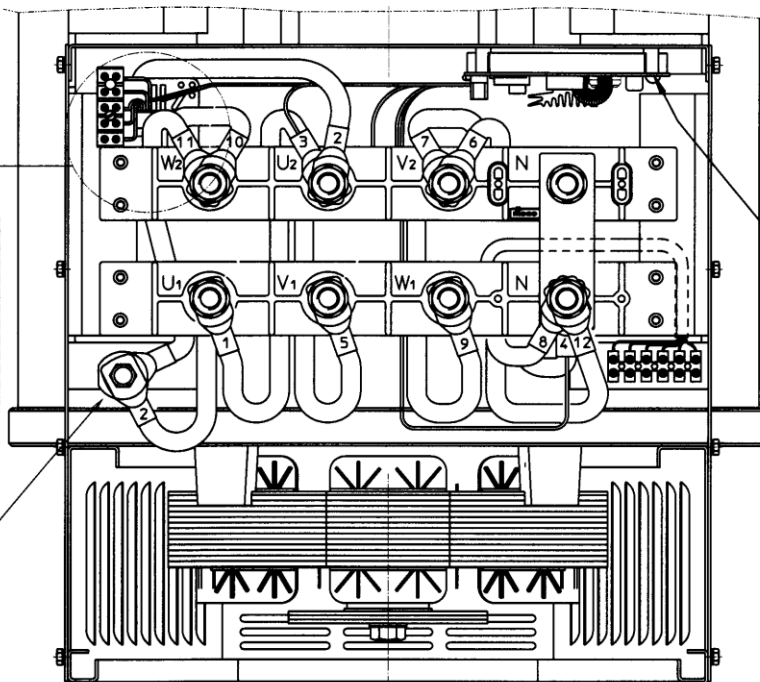
TERMINAL BOX 38 WITH PARALLEL DEVICE



DISPOSITIVO DI PARALLELO
 PARALLEL DEVICE
 DISPOSITIF DE PARALLELE
 STATIKWANDLER
 DISPOSITIVO DE PARALELO



ISOLATORE
 INSULATOR
 ISOLATEUR
 AISLADOR



REGOLATORE ELETTRONICO U.V.R.6/1-F
 ELECTRONIC REGULATOR U.V.R.6/1-F
 REGULATEUR ELECTRONIQUE U.V.R.6/1-F
 ELEKTRONISCHER REGLER U.V.R.6/1-F
 REGULADOR ELECTRONICO U.V.R.6/1-F

Series star connection

Table 20

TERMINAL BOX 40

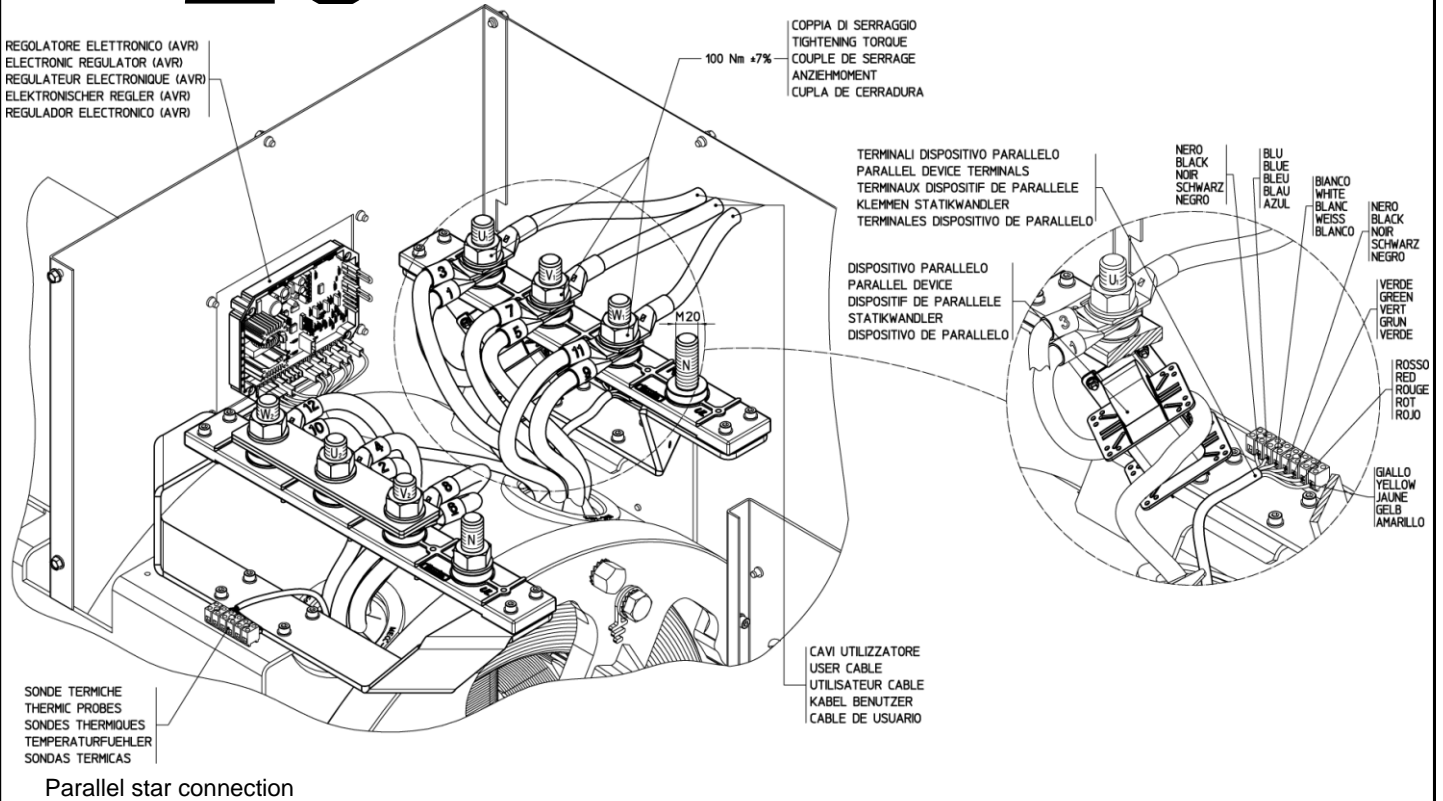


Table 21

TERMINAL BOX 43

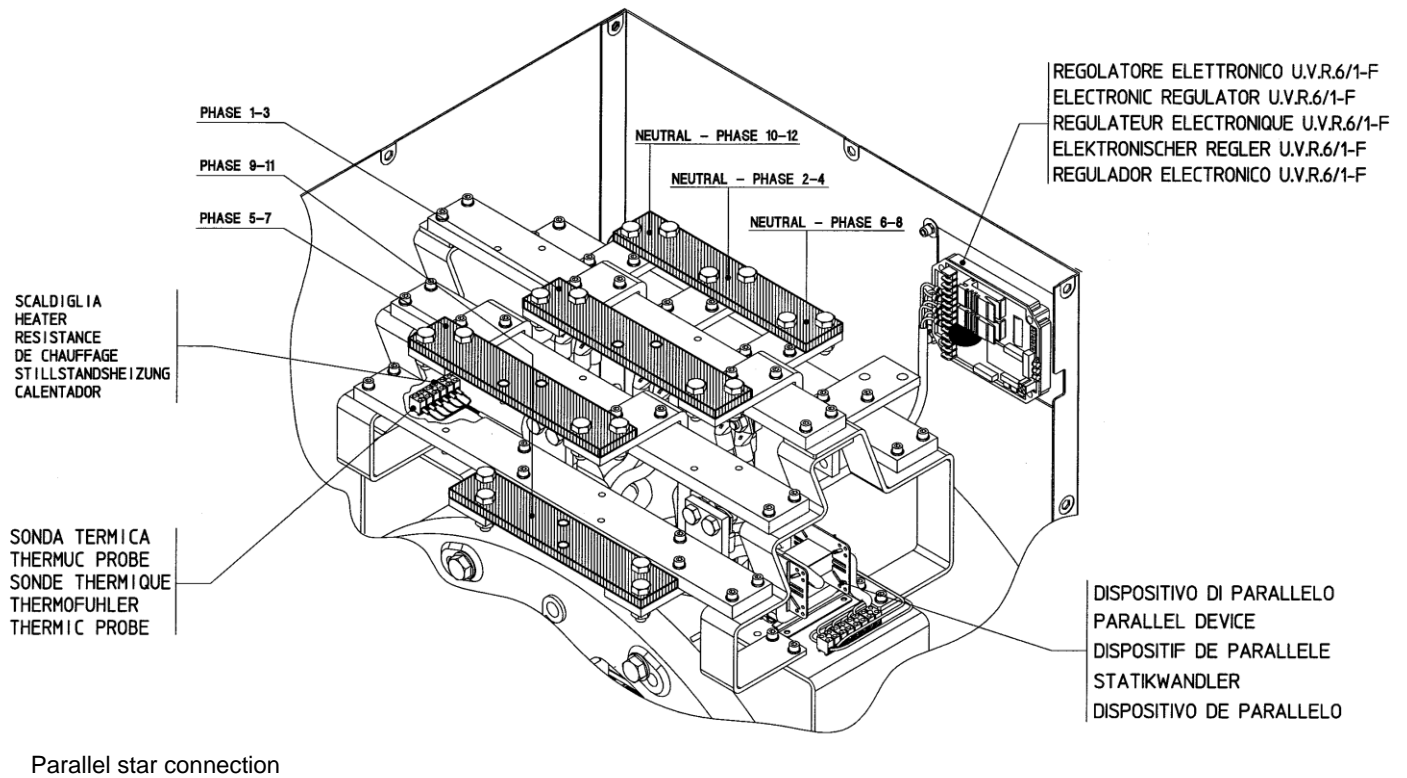
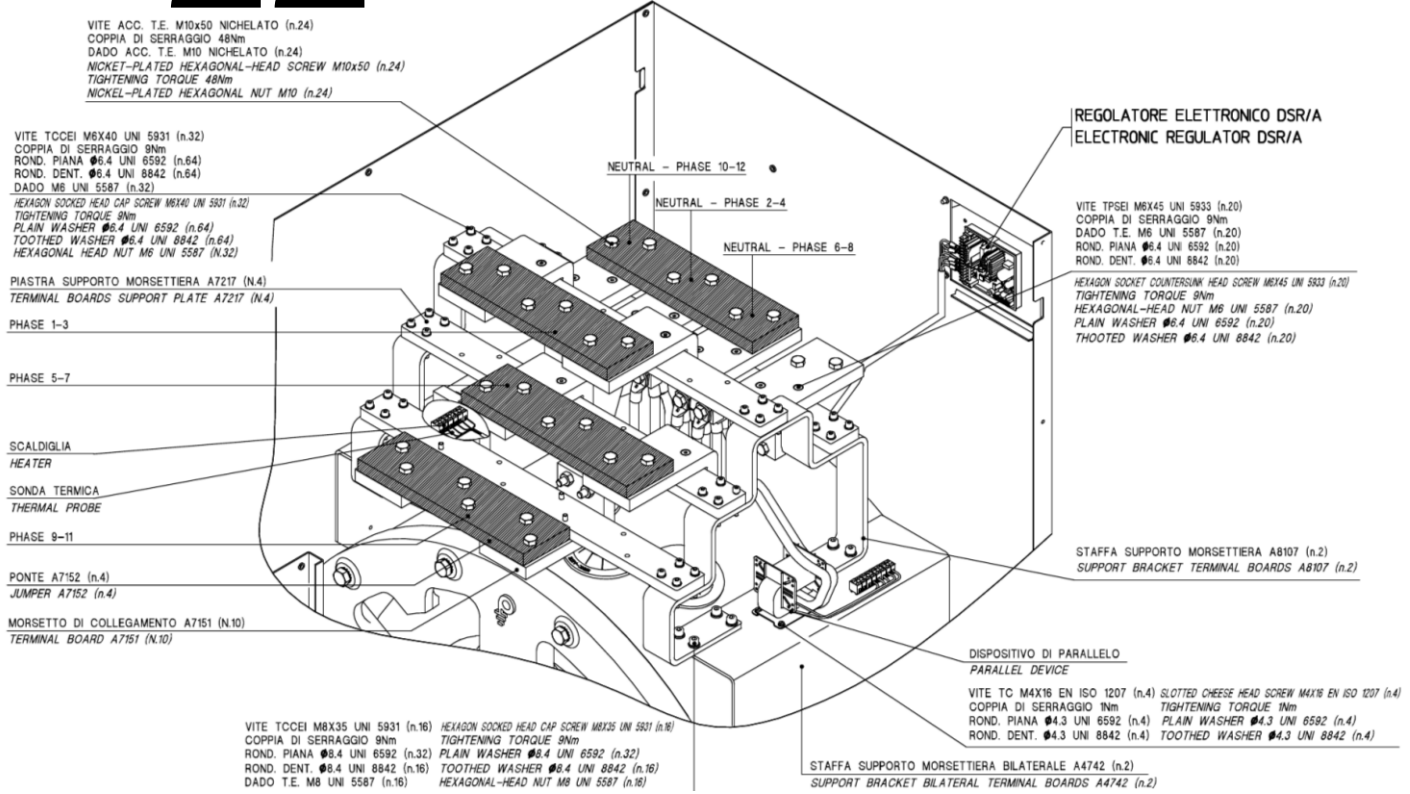


Table 22

TERMINAL BOX 46



Parallel star connection

Table 23

PERIODIC MAINTENANCE AND BEARING TABLE

All bearings are greased during assembly.

Use SKF LGMT2 or equivalent grease for normal operation.

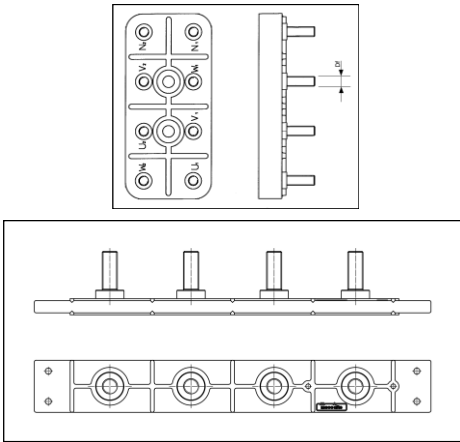
Alternator type	Bearing type		Lubrication		Quantity	
	L.A. D.E. R.A.R.	L.O.A. N.D.E. R.A.V.	L.A. D.E. R.A.R.	L.O.A. O.D.E. R.A.V.	L.A. D.E. R.A.R.	L.O.A. O.D.E. R.A.V.
ECP 28	6308.2RS	6305.2RS	(*)	(*)	-	-
ECP 32	6312.2RS	6309.2RS	(*)	(*)	-	-
ECP 34	6314.2RS	6311.2RS	(*)	(*)	-	-
ECO 38N	6318.2RS	6314.2RS	(*)	(*)	-	-
ECO 40	6322	6318.2RS	4.000	(*)	60	-
ECO 43N	6324	6322	4.000	4.000	70	60
ECO 46	6330M	6324	4.000	4.000	90	70

(*) Sealed bearings:

no maintenance is necessary for their entire working life (approximately 30.000 hours).

Table 24

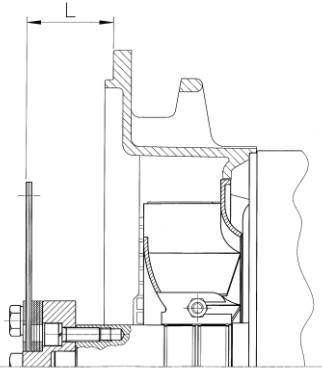
TERMINAL BOARD TIGHTENING TORQUE TABLE



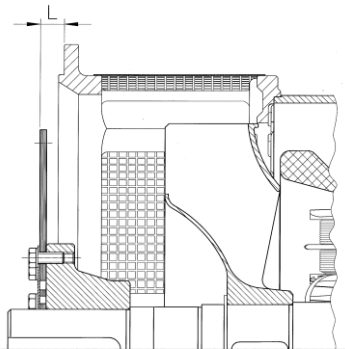
THREAD DIAMETER Df	TYPE	TIGHTENING TORQUE (Nm)
M6	ECP28	8 ± 7%
M8	ECO32	18 ± 7%
M10 (Steel)	ECO43-ECO46	48 ± 7%
M12	ECP34	42 ± 7%
M14	ECP32-34 special	54 ± 7%
M16	ECO38	80 ± 7%
M20	ECO40	100 ± 7%

COUPLING DISCS TIGHTENING TORQUE TABLE

TYPE 28 - 32

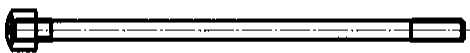


TYPE 34 - 38 - 40 - 43 - 46



TYPE	SAE	L	SCREWS DIMENSIONS		TIGHTENING TORQUE (Nm)	
			TE	TCCEI	CL. 8.8	CL. 12.9
ECP28	6 ½	30,2	M10x30-8.8	/	48	/
	7 ½	30,2	M10x30-8.8	/	48	/
	8	62	M12x30-8.8	M10x30-8.8	80-48	/
	10	53,8	M12x30-8.8	M10x30-8.8	80-48	/
ECP32	11 ½	39,6	M10x40-8.8	/	48	/
	6 ½	30,2	/	M12x40-12.9	/	140
	7 ½	30,2	/	M12x40-12.9	/	140
	8	62	M12x30-8.8	M12x40-12.9	80	140
	10	53,8	M12x30-8.8	M12x40-12.9	80	140
ECP34	11 ½	39,6	/	M12x40-12.9	/	140
	10	53,8	M10x30-8.8	M10x40-8.8	48	/
	11 ½	39,6	M10x45-8.8	/	48	/
ECO38-N	14	25,4	M10x30-8.8	/	48	/
	11 ½	39,6	M12x45-8.8	/	80	/
ECO40	14	25,4	M12x30-8.8	/	80	/
	14	25,4	M16x45-8.8	/	200	/
ECO43-N	18	15,7	M16x40-8.8	/	200	/
	14	25,4	M16x55-8.8	/	200	/
	21	0	M16x40-8.8	/	200	/
ECO46	18	15,7	M16x40-8.8	/	200	/
	21	0	M16x40-8.8	/	200	/

STAY BOLT TIGHTENING TORQUE TABLE



THREAD DIAMETER Df	TYPE	TIGHTENING TORQUE (Nm)
M8	ECP28	17 ± 7%
M10	ECP32	48 ± 7%
M14	ECP34	120 ± 7%
M12	ECO38	100 ± 7%
M16	ECO40	180 ± 7%
M14	ECO43-46	120 ± 7%

Table 25

AIR FLOW, NOISE AND WEIGHT

4 POLE GENERATOR

TYPE	Air flow		Noise				Weight Kg
	m ³ /min		50 Hz		60 Hz		
	50 Hz	60 Hz	1m	7m	1m	7m	
ECP 28 1VS	5,3	5,8	68	57	71	61	79
ECP 28 2VS							86
ECP 28 0S							96
ECP 28 S							104
ECP 28 M							115
ECP 28 2L							136
ECP 28VL							162
ECP 32 2S	11,8	14,5	75	60	79	64	194
ECP 32 3S							209
ECP 32 1L							243
ECP 32 2L							277
ECP 32 3L							293
ECP 34 1S	19,3	23	79	65	83	69	331
ECP 34 2S							409
ECP 34 1L							467
ECP 34 2L							481
ECP 34 3L							485
ECO 38 1SN	32	39	82	69	86	73	510
ECO 38 2SN							560
ECO 38 3SN							590
ECO 38 1LN							680
ECO 38 2LN							765
ECO 38 3LN							905
ECO 40 1S	54	64,8	94	82	98	88	1040
ECO 40 2S							1118
ECO 40 3S							1171
ECO 40 1L							1324
ECO 40 1.5L							1380
ECO 40 2L							1586
ECO 40 VL							1693
ECO 43 1SN	90	108	95	84	99	89	1870
ECO 43 2SN							2090
ECO 43 1LN							2395
ECO 43 2LN							2660
ECO 43 VL							2950
ECO 46 1S	135	162	97	86	100	91	3010
ECO 46 1.5S							3380
ECO 46 2S							3565
ECO 46 1L							3810
ECO 46 1.5L							4260
ECO 46 2L							4380

2 POLE GENERATOR

TYPE	Air flow		Noise				Weight Kg
	m ³ /min		50 Hz		60 Hz		
	50 Hz	60 Hz	1m	7m	1m	7m	
ECP 28 M	9,7	11	86	74	90,5	78	126
ECP 28 2L							136
ECP 28 3L							141
ECP 28 VL							156
ECP 32 2S	22,4	27	88	77	93	80	173
ECP 32 3S							199
ECP 32 1L							212
ECP 32 2L							231

Table 26

PROCEDURE TO CHECK THE DIODES OF THE EXCITER ROTOR



ALTERNATOR TYPE : 28-32

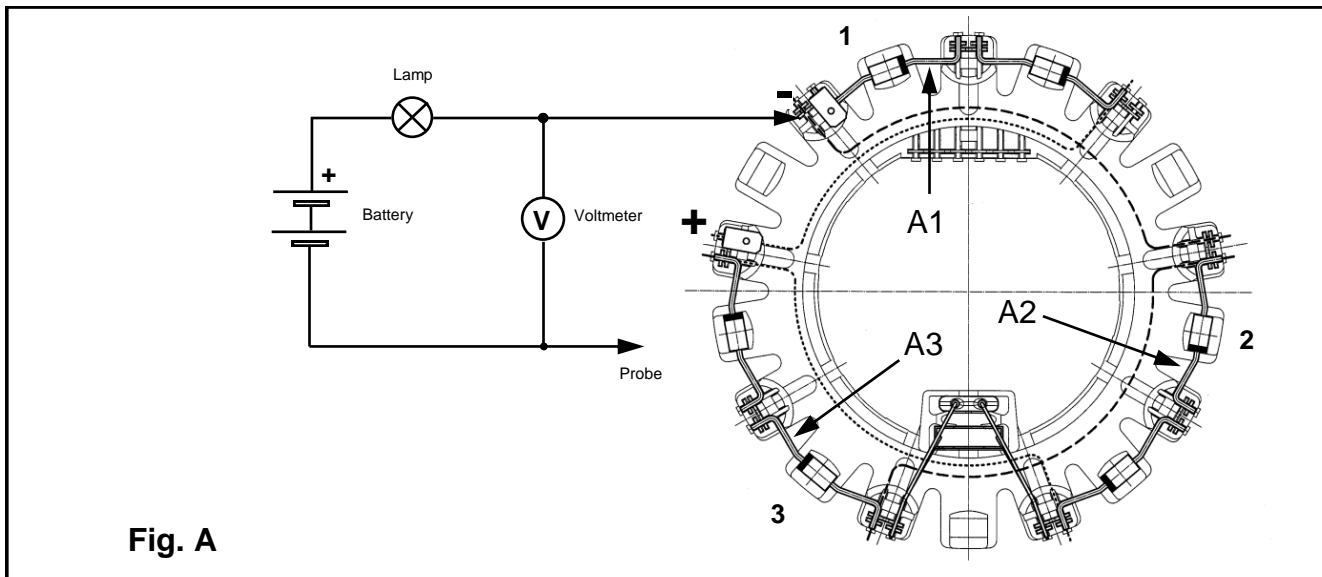


Fig. A

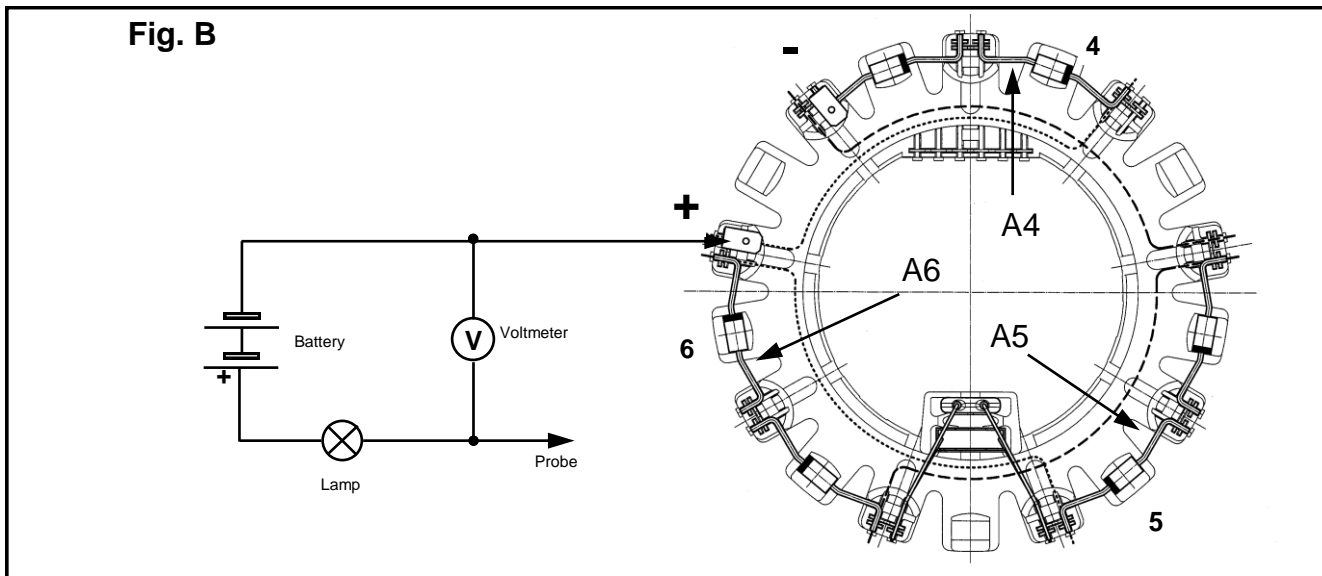


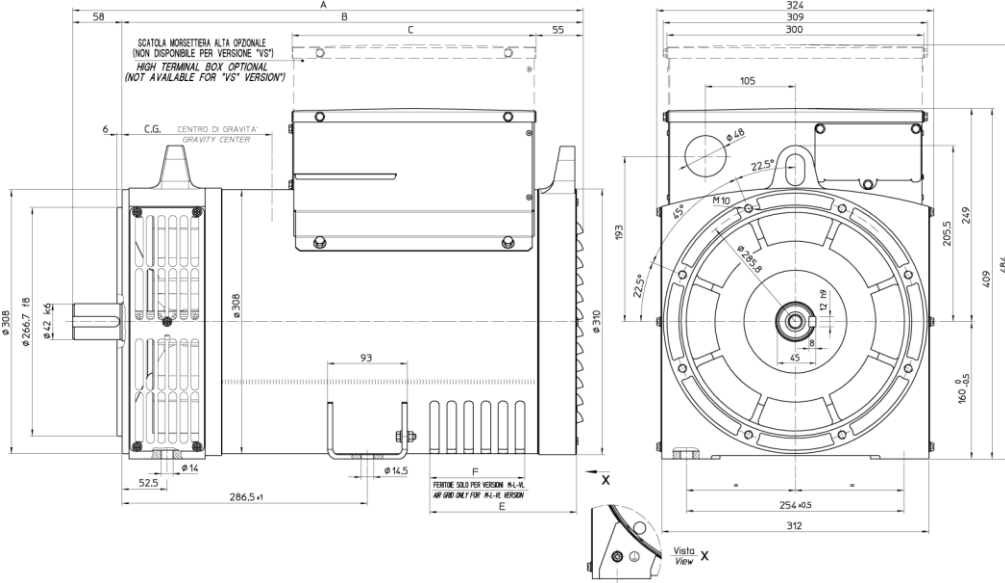
Fig. B

2 and 4 pole ALTERNATOR TYPE	VOLTAGE MEASURED (fig. A-B)		
	Good diode	Diode in short	Diode open
ECP28, ECP32-2S, ECP32-3S	from 0,8V to 1,2V	Lower than 0,6V	More than 1,3V
ECP32-1L, ECP32-2L, ECP32-3L/4	from 0,8V to 1,2V	Lower than 0,6V	More than 1,4V

ECP 28

FORM B3/B14

dimensions in mm



TYPE	A	B	C	E	F
28 1VS/4 - 2VS/4	477	419	225	/	/
28 OS/4 - S/4	517	459	285	/	/
28 M/4 - M/2	552	494	285	131,5	71
28 2L/4 - 2L/2 28 3L/2	597	539	285	171,5	111
28 VL	627	569	285	171,5	111

TYPE	CG*
28-1VS/4	230
28-2VS/4	230
28-OS/4	235
28-S/4	237
28-M/4	250
28-2L/4	275
28-VL/4	286

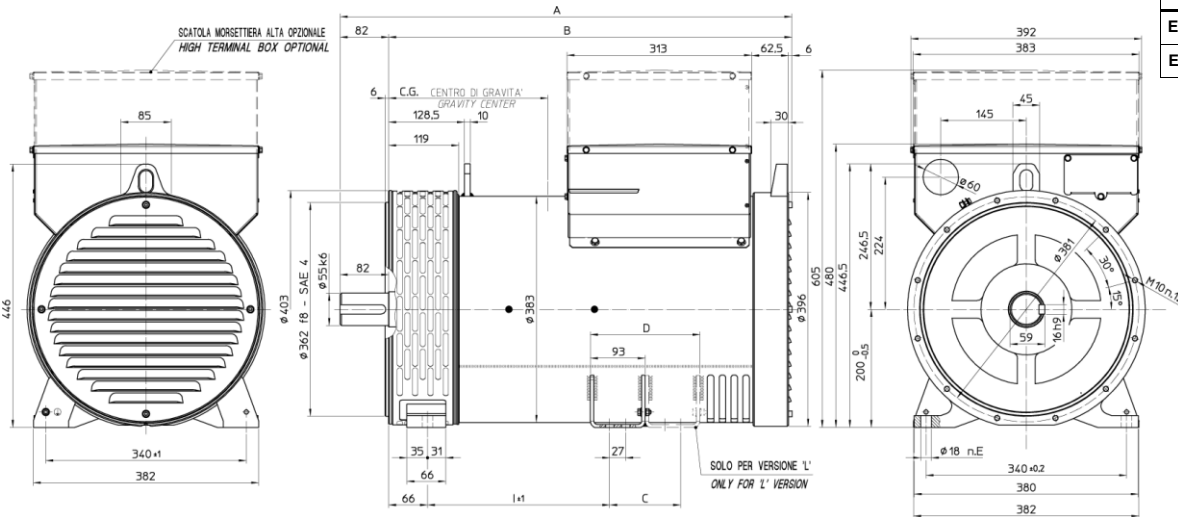
TYPE	CG*
28-M/2	245
28-2L/2	271
28-3L/2	275
28-VL/2	291

* Center of Gravity

ECP 32/2

FORM B3/B14

dimensions in mm



TYPE	A	B	I	C	D	E
ECP32 S	658	576	204	-	-	6
ECP32 L	763	681	309	120	186	10

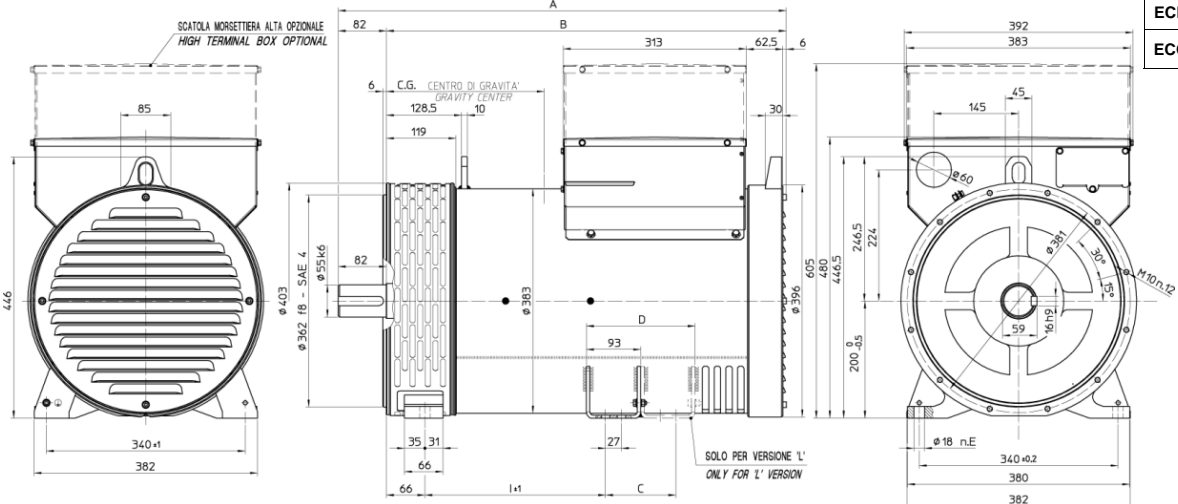
TYPE	CG*
31-2S/2	267
31-3S/2	272
31-1L/2	311
31-2L/2	328

* Center of Gravity

ECP 32/4

FORM B3/B14

dimensions in mm



TYPE	A	B	I	C	D	E
ECP32 S	638	556	184	-	-	6
ECO32 L	763	681	309	120	186	10

TYPE	CG*
32-2S/4	269
32-3S/4	274
32-1L/4	316
32-2L/4	330
32-3L/4	351

* Center of Gravity

ECP 28

FORM MD35

dimensions in mm

SAE N°	Disc coupling				
	L	d	Q1	S1	α1
6 ½	30,2	215,9	200	9	60°
7 ½	30,2	241,3	222,25	9	45°
8	62	263,52	244,47	11	60°
10	53,8	314,32	295,27	11	45°
11 ½	39,6	352,42	333,37	11	45°

TYPE	A	C	E	F
28 1VS - 2VS	405	225	/	/
28 OS - S	445	285	/	/
28 M/4 - M/2	480	285	131,5	71
28 2L/2 - 3L/2	525	285	171,5	111
28 2L/4	555	285	171,5	111

SAE N°	Flange				TYPE	CG*
	O	P	Q	α		
5	356	314,3	333,4	45°	28-1VS	200
4	403	362	381	30°	28-2VS	200
3	451	409,6	428,6	30°	28-OS	214
2	490	447,7	466,7	30°	28-S/4	217
					28-M/4	238
					28-2L/4	254
					28-M/2	233
					28-2L/2	248
					28-3L/2	254
					28-VL/2	273

* Center of Gravity

ECP 32/2

FORM MD35

dimensions in mm

SAE N°	Disc coupling				
	L	d	Q1	S1	α1
6 ½	30,2	215,9	200	9	60°
7 ½	30,2	241,3	222,25	9	45°
8	62	263,52	244,47	11	60°
10	53,8	314,32	295,27	11	45°
11 ½	39,6	352,42	333,37	11	45°

TYPE	A	I	C	D	E
ECP32 S	621	315	-	-	4
ECP32 L	726	420	120	186	8

SAE N°	Flange			
	O	P	Q	α
5	356	314,3	333,4	45°
4	403	362	381	30°
3	451	409,6	428,6	30°
2	490	447,7	466,7	30°
1	552	511,2	530,2	30°

TYPE	CG*
32-2S/2	312
32-3S/2	314
32-1L/2	335
32-2L/2	360

* Center of Gravity

ECP 32/4

FORM MD35

dimensions in mm

SAE N°	Disc coupling				
	L	d	Q1	S1	α1
6 ½	30,2	215,9	200	9	60°
7 ½	30,2	241,3	222,25	9	45°
8	62	263,52	244,47	11	60°
10	53,8	314,32	295,27	11	45°
11 ½	39,6	352,42	333,37	11	45°

SAE N°	Flange			
	O	P	Q	α
5	356	314,3	333,4	45°
4	403	362	381	30°
3	451	409,6	428,6	30°
2	490	447,7	466,7	30°
1	552	511,2	530,2	30°

TYPE	A	I	C	D	E
ECO 32 S	601	295	-	-	4
ECO 32 L	726	420	120	186	8

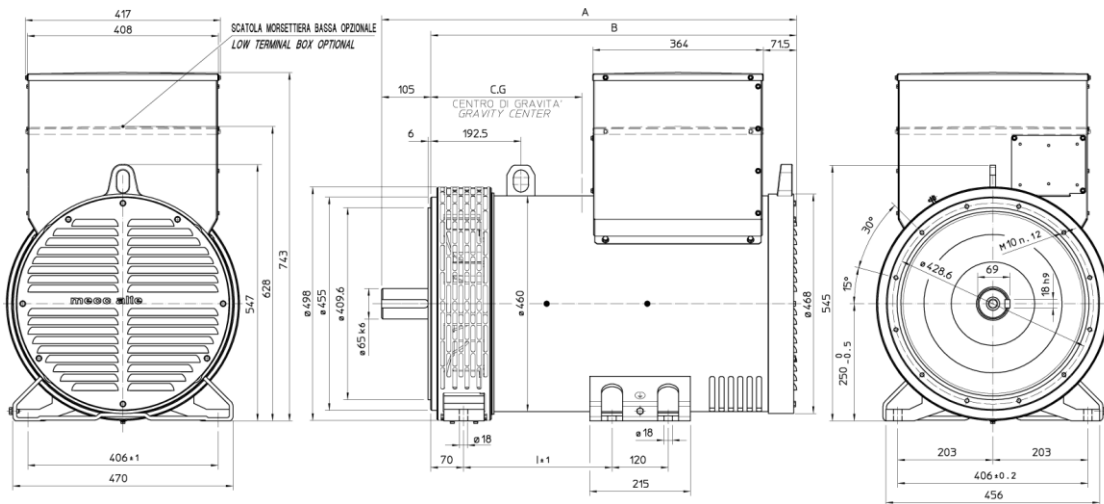
TYPE	CG*
32-2S/4	312
32-3S/4	316
32-1L/4	366
32-2L/4	377
32-3L/4	388

* Center of Gravity

ECP 34

FORM B3/B14

dimensions in mm



TYPE	A	B	I
34 S	806,5	701,5	227
34 L	886,5	781,5	317

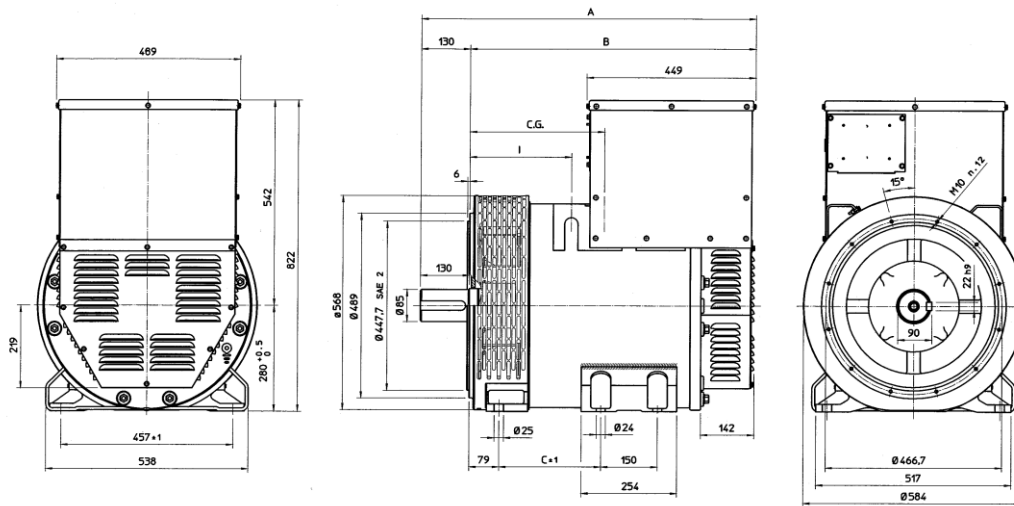
TYPE	CG*
34-1S/4	310
34-2S/4	350
34-1L/4	365
34-2L/4	390
34-3L/4	390

* Center of Gravity

ECO 38N

FORM B3/B14

dimensions in mm



TYPE	A	B	C	I
38 SN	888	758	270	269
38 LN	1098	968	430	479

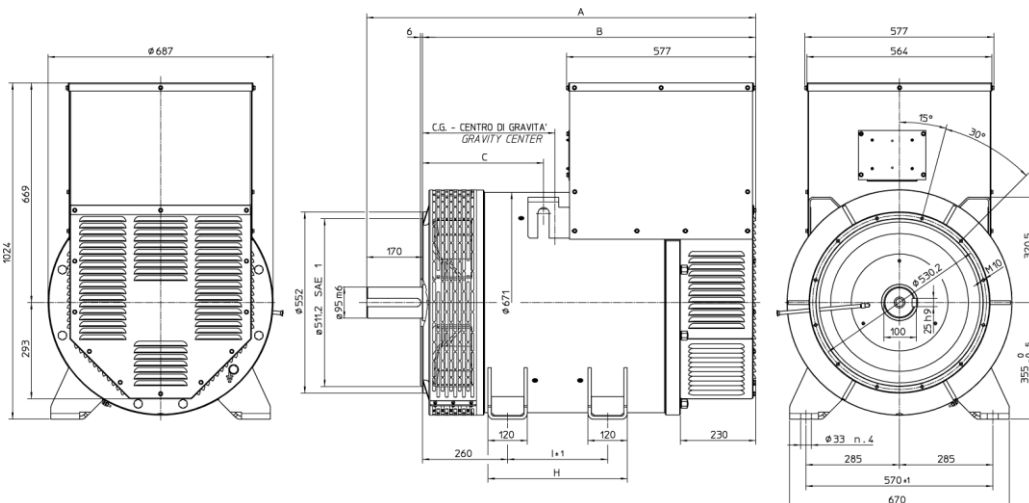
TYPE	CG*
38-1SN/4	358
38-2SN/4	371
38-3SN/4	385
38-1LN/4	400
38-2LN/4	437
38-3LN/4	476

* Center of Gravity

ECO 40

FORM B3/B14

dimensions in mm



TYPE	A	B	C	I	H
40 S	1187	1017	369,5	305	425
40 L	1352	1182	534,5	470	590
40 VL	1452	1282	634,5	470	590

TYPE	CG*
40-1S/4	362
40-2S/4	372
40-3S/4	442
40-1L/4	537
40-1.5L/4	542
40-2L/4	547
40-VL/4	594

* Center of Gravity

ECP 34

FORM MD35

dimensions in mm

TYPE	CG*	SAE N°	Flange		
			O	P	Q
34-1S/4	358	3	451	409,6	428,6
34-2S/4	398				
34-1L/4	415				
34-2L/4	440				
34-3L/4	440	2	489	447,7	466,7
		1	552	511,2	530,2

* Center of Gravity

SAE N°	Disc coupling			
	L	d	Q1	S
10	53,8	314,32	295,27	11
11½	39,6	352,42	333,37	11
14	25,4	466,72	438,15	14

TYPE	A	B	I
34 S	817,5	760,5	356
34 L	897,5	840,5	446

ECO 38N

FORM MD35

dimensions in mm

TYPE	A	B	C	I
38 SN	888	829	420	340
38 LN	1098	1039	580	550

SAE N°	Disc coupling					
	L	d	Q1	N° holes	S1	α1
11 ½	39,6	352,42	333,37	8	11	45°
14	25,4	466,72	438,15	8	14	45°

TYPE	CG*	SAE N°	Flange		
			O	P	Q
38-1SN/4	405	3	451	409,6	428,6
38-2SN/4	420				
38-3SN/4	436				
38-1LN/4	455				
38-2LN/4	495	1	552	511,2	530,2
		½	648	584,2	619,1
38-3LN/4	540				

* Center of Gravity

ECO 40

FORM MD35

dimensions in mm

SAE N°	Flange					
	O	P	Q	N° fori	S	α
1	552	511,2	530,2	12	11	30°
½	648	584,2	619,1	12	14	30°
0	711	647,7	679,5	16	14	22,5°
00	883	787,4	850,9	16	14	22,5°

SAE N°	Disc coupling					
	L	d	Q1	N° holes	S1	α1
14	25,4	466,72	438,15	8	14	45°
18	15,7	571,5	542,92	6	17	60°

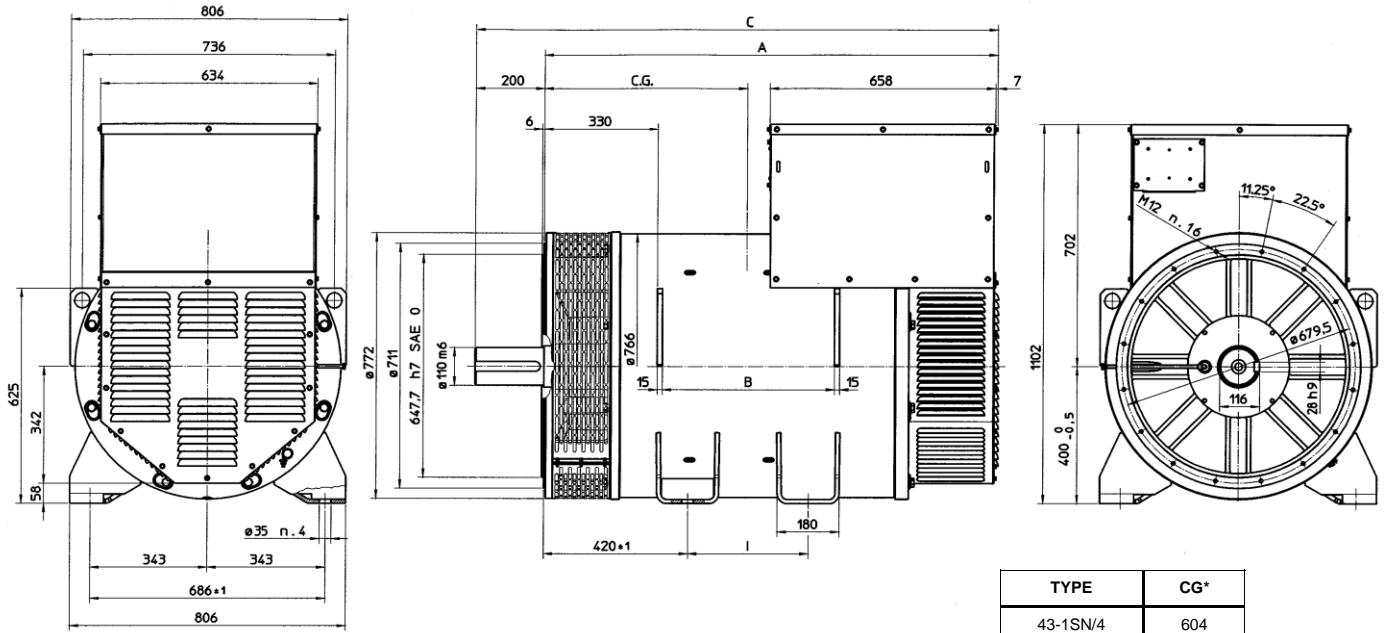
TYPE	CG*	TYPE	B	C	I	H
40-1S/4	422	40 S	1077	429,5	305	425
40-2S/4	432					
40-3S/4	442					
40-1L/4	597	40 L	1242	594,5	470	590
40-1.5L/4	600					
40-2L/4	607	40 VL	1342	604,5	470	590
40-VL/4	650					

* Center of Gravity

ECO 43N

FORM B3/B14

dimensions in mm



TYPE	A	B	C	I
43 SN	1320	500	1520	350
43 LN	1520	700	1720	550
43 VL	1600	780	1800	550

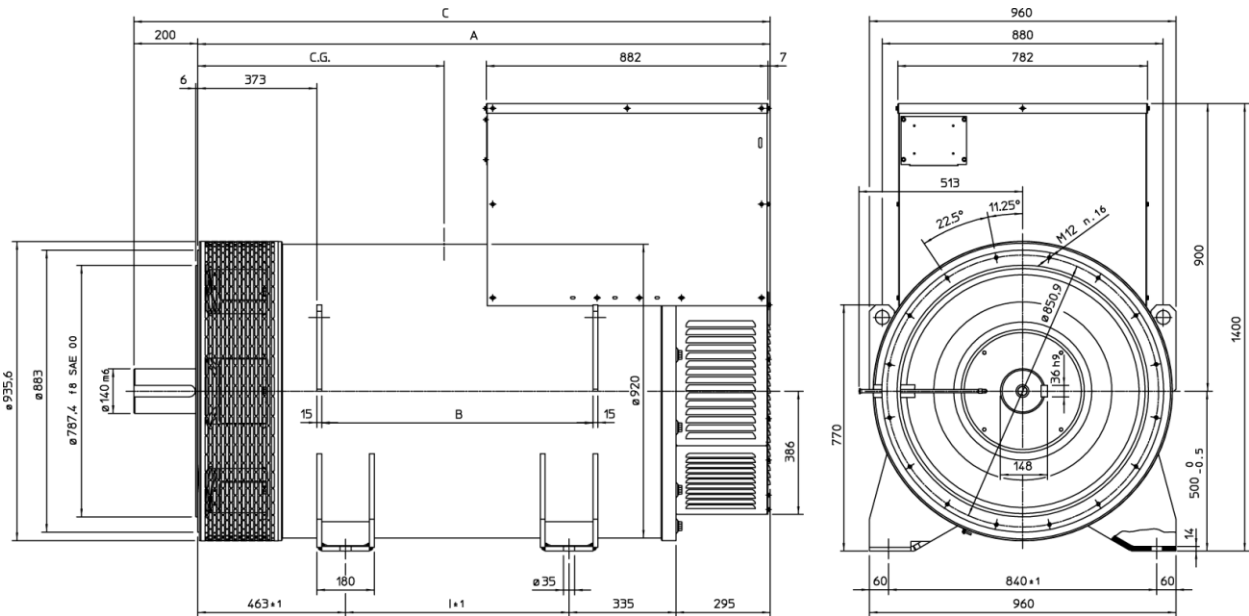
TYPE	CG*
43-1SN/4	604
43-2SN/4	614
43-1LN/4	670
43-2LN/4	714
43-VL/4	756

* Center of Gravity

ECO 46

FORM B3/B14

dimensions in mm



TYPE	A	B	C	I
46 S	1563	620	1763	470
46 L	1793	850	1993	700

TYPE	CG*
46-1S/4	627
46-1.5S/4	689
46-2S/4	701
46-1L/4	772
46-1.5L/4	800
46-2L/4	817

* Center of Gravity

ECO 43N

FORM MD35

dimensions in mm

SAE N°	Disc coupling					
	d	L	M	Q1	N° holes	α1
18	571,5	15,7	10	542,92	6	60°
21	673,1	0	12	641,35	12	30°

SAE N°	Flange		
	O	P	Q
0	711	647,7	679,5
00	883	787,4	850,9

TYPE	CG*
43-1SN/4	630
43-2SN/4	654
43-1LN/4	720
43-2LN/4	760
43-VL/4	796

TYPE	A	B	I
43 SN	1365	500	350
43 LN	1565	700	550
43 VL	1645	780	550

* Center of Gravity

ECO 46

FORM MD35

dimensions in mm

SAE N°	Disc coupling					
	d	L	M	Q1	N° holes	α
18	571,5	15,7	15	542,92	6	60°
21	673,1	0	17	641,35	12	30°

SAE N°	Flange		
	O	P	Q
0	711	647,7	679,5
00	883	787,4	850,9

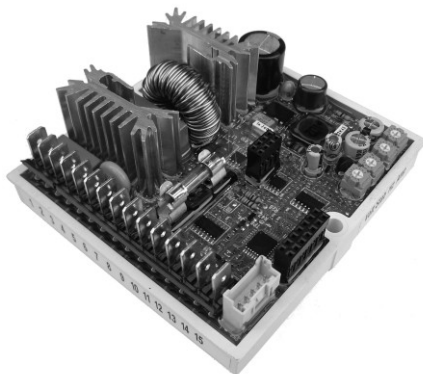
TYPE	A	B	I
46 S	1600	620	470
46 L	1830	850	700

TYPE	CG*
46-1S/4	664
46-1.5S/4	728
46-2S/4	741
46-1L/4	812
46-1.5L/4	839
46-2L/4	856

* Center of Gravity

DSR APPENDIX

DSR DIGITAL REGULATOR



Further information about DSR regulator are available in the web site download area at following address :

www.meccalte.com

INSTALLATION

Upon receipt of the digital regulator, perform a visual inspection to ensure that no damage has been sustained during transportation and movement of the equipment. In the event of damage, advise the shipper, the insurance company, the seller or Mecc Alte immediately. If the regulator is not installed immediately, store it in its original packaging in a dust and humidity-free environment. The regulator is normally installed in the generator terminal box. It is fixed with two M4x20 or M4x25 screws and must be installed in a location where the temperature does not exceed the environmental conditions foreseen.

CONNECTIONS

The digital regulator connections depend on the application and excitation system. **An error in connection may have serious consequences for the unit.** Carefully check to make sure that all connections are precise and in accordance with the attached drawings, before turning on the power.

TERMINALS

The connections must be made using cables having a minimum diameter :

- 1,5 mm² for power cables on terminals 1, 2, 3 and 9 (Exc-, Aux/exc+, Aux)
- 0,5 mm² for signal cables

INPUTS AND OUTPUTS : TECHNICAL SPECIFICATIONS

TABELLA 1 : CONNETTORE CN1			
Terminal ⁽¹⁾	Name	Function	Specifications
1	Exc-	Excitation	Continuous Rating : 4Adc max Transitory Rating : 12Adc peak
2	Aux/Exc+		
3	Aux/Exc+	Power	Frequency : from 12Hz to 72Hz Range: 40Vac - 270Vac
9	Aux/Neutral		
4	F_phase	Sensing	Range: 140Vac - 280Vac Burden : <1VA
5	F_Phase		
6	H_phase	Sensing	Range: 70Vac - 140Vac Burden : <1VA
7	H_phase		
8	Aux/Neutral		
10	Vext/Pext	Input for remote voltage control	Type: Not isolated Range: 0 - 2,5Vdc or Potentiometer 10K Adjustment: from -14% to +14% ⁽³⁾ Burden: 0 - 2 mA (sink) Max length: 30m ⁽²⁾
11	Common		
12	50/60Hz	Jumper Input 50/60Hz	Type: Not isolated Max length: 3m
13	Common		
14	A.P.O.	Active protections output	Type: Open collector not isolated Current : 100mA Voltage: 30V Max length: 30m ⁽²⁾
15	Common		

Note 1) The terminals are connected to each other on the board: 2 with 3, 4 with 5, 6 with 7, 8 with 9, 11 with 13 and 15.

Note 2) with external EMI SDR 128/K filter (3m without EMI filter)

Note 3) starting from revision 10 of the Firmware. It is convenient do not exceed $\pm 10\%$

DSR regulator, on board of new generators, is already calibrated; in case of loose regulators (ie spare parts) or in case of wiring modifications or adjusting, to guarantee its correct working, it must be accurately set .

Basic settings can be done directly on the regulator by its four trimmers (VOLT - STAB - Hz - AMP), the jumper 50/60 and the Vext input. More detailed settings or measures can be done exclusively by software using for example the MeccAlte communication interface DI1 and the program DSR_Terminal or DSR_Reader.

Vext Input

The Vext input (connector CN1 – terminals 10 and 11) permits analogical remote control of output voltage through a 10Kohm potentiometer with a programmable variation range through parameter 16 with respect to the value set (by default the setting is $\pm 14\%$ starting from revision 10 of the Firmware); if you want to use continuous voltage, it will be effective if it is in the range between 0V and +2,5V. The input tolerates voltages from -5V to +5V, but for values exceeding the limits of 0V / +2,5V (or in the event of disconnection), two options are possible: not to take the set point of external input (default configuration) and return to regulation to the voltage value set with the trimmer (if enabled) or with parameter 19, or keep the minimum (or maximum) value of voltage that can be reached. The two options can be set with the **RAM Voltage CTRL** flag in the **Configuration** menu corresponding to the bit B7 of the configuration word P[10].

NOTE : The DC voltage generator must be able to sink at least 2mA. In making adjustments it is recommended not to exceed the nominal value of voltage of the alternator beyond $\pm 10\%$

50/60 Signal

A jumper is located on the 50/60 input (connector CN1, terminals 12 and 13); it provokes the commutation of the underspeed protection threshold from 50-(100%- α Hz%) to 60-(100%- α Hz%), where α Hz% represents the position relative to the Hz trimmer.

APO Contact

The acronym APO stands for **Active Protection Output**: (connector CN1 – terminals 14 and 15) 30V-100mA non-insulated open collector transistor, normally opened, is closed (with a delay that can be programmed by software from 1 to 15 seconds) when, among all the alarms, one or more of the active ones can be selected separately by software.

The **VOLT trimmer** allows adjustment from about 70V to about 140V when using for sensing terminals 4 and 5, or from about 140V to about 280V when using terminals 6 and 7.

The **STAB trimmer** adjusts the dynamic response (statism) of the alternator under transient conditions.

The **AMP trimmer** adjusts the excitation overcurrent protection intervention threshold.

Use the following procedure in order to calibrate the overload protection:

- 1) Rotate the Hz trimmer entirely in the counter clockwise direction
- 2) Apply the nominal load to the alternator.
- 3) Decrease the speed by 10%
- 4) Rotate the AMP trimmer completely in the counter clockwise direction.
- 5) After a few seconds, there should be a decrease in the voltage value of the generator and alarm 5 should come on (visible due to a change in the flashing indicator light) .
- 6) Under these conditions, rotate the AMP trimmer slowly in the clockwise direction, until the output voltage value is 97% of the nominal value: alarm 5 is still activated.
- 7) Return to the nominal speed; alarm 5 should disappear in a few seconds and the generator voltage should increase to the nominal value.
- 8) Re-adjust the trimmer as indicated in the following paragraph.

The **Hz trimmer** allows to calibrate the threshold of the intervention of the under frequency protection up to -20% with respect to the nominal speed value set by jumper 50/60 (at 50 Hz the threshold can be calibrated from 40 Hz to 50 Hz, at 60 Hz the threshold can be calibrated from 48 Hz to 60 Hz).

The intervention of this protection reduce the output generator voltage and, to calibrate it, use the following procedure :

- 1) Rotate the Hz trimmer entirely in the counter clockwise direction.
- 2) If the machine has to operate at 60 Hz, ensure that the bridge is inserted between terminals 12 and 13 of the CN1 connector.
- 3) Bring the generator to 90% of the nominal speed.
- 4) Slowly turn the "Hz" trimmer, rotating it clockwise until the generator voltage begins to drop and ascertain that the indicator light simultaneously begins flashing rapidly.
- 5) By increasing speed, the generator voltage will normalise and the alarm will disappear.
- 6) Set the speed to the nominal value.

During normal operation and a duty cycle of 50% an indicator light mounted on the board flashes every 2 seconds; it flashes differently in the event of intervention or alarm, as indicated in figure 1.

NOTE: Notwithstanding DSR maintains the voltage regulation, it goes in shutdown mode if the frequency decreases under 20Hz. The reset needs the Gen-Set switching off.

N.	Description of event	Action
1	Checksum EEPROM	Reset default, Blockage
2	Overvoltage	APO
3	Undervoltage	APO
4	Short circuit	APO, Maximum current, Blockage
5	Excitation overcurrent	APO, Reduction of excitation current
6	Underspeed	APO, Ramp V/F
7	Overspeed	APO

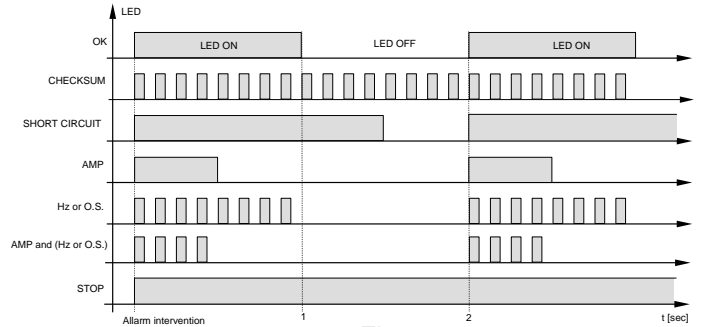
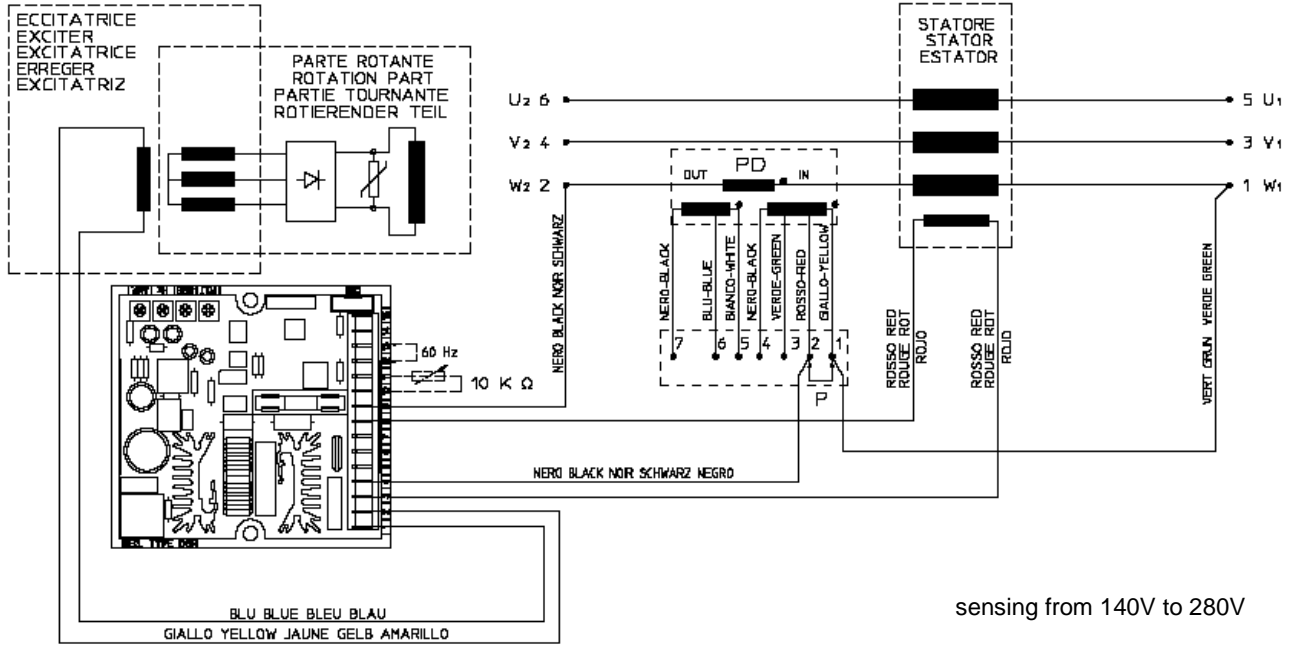


Fig. 1

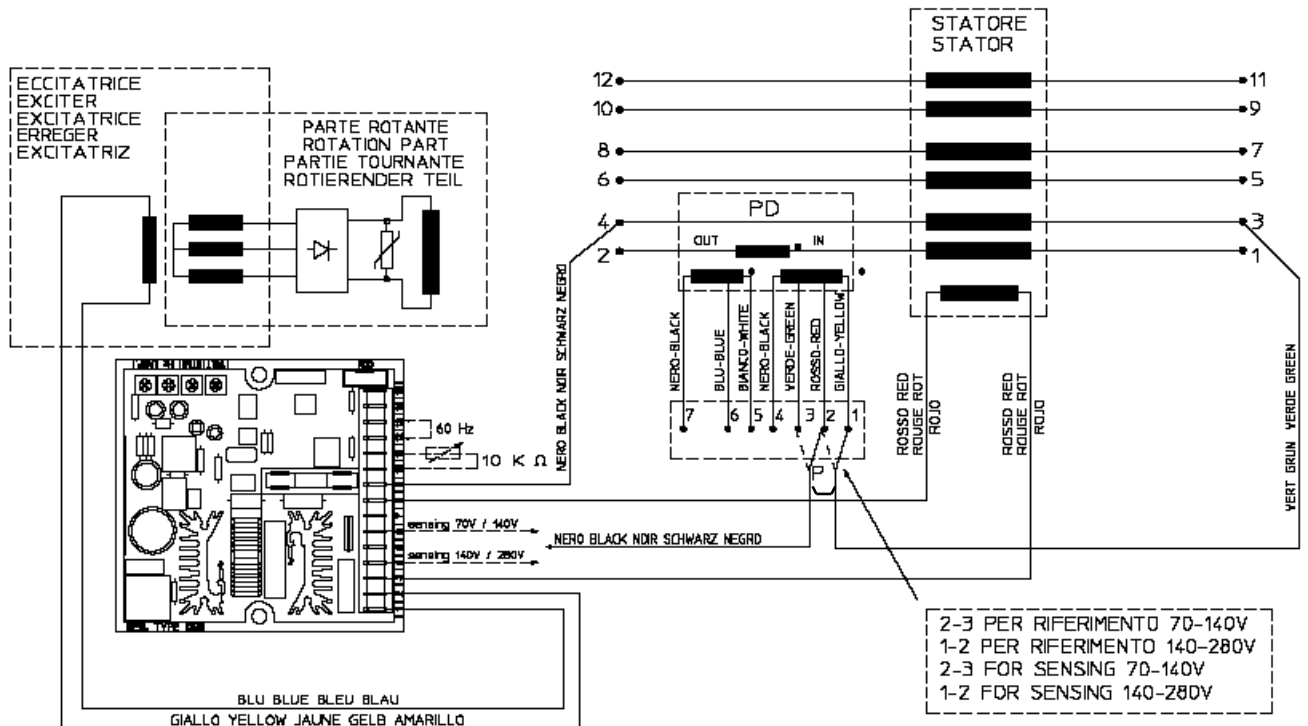
6 terminal alternators

SCC0061/02



12 terminal alternators

SCC0100/00

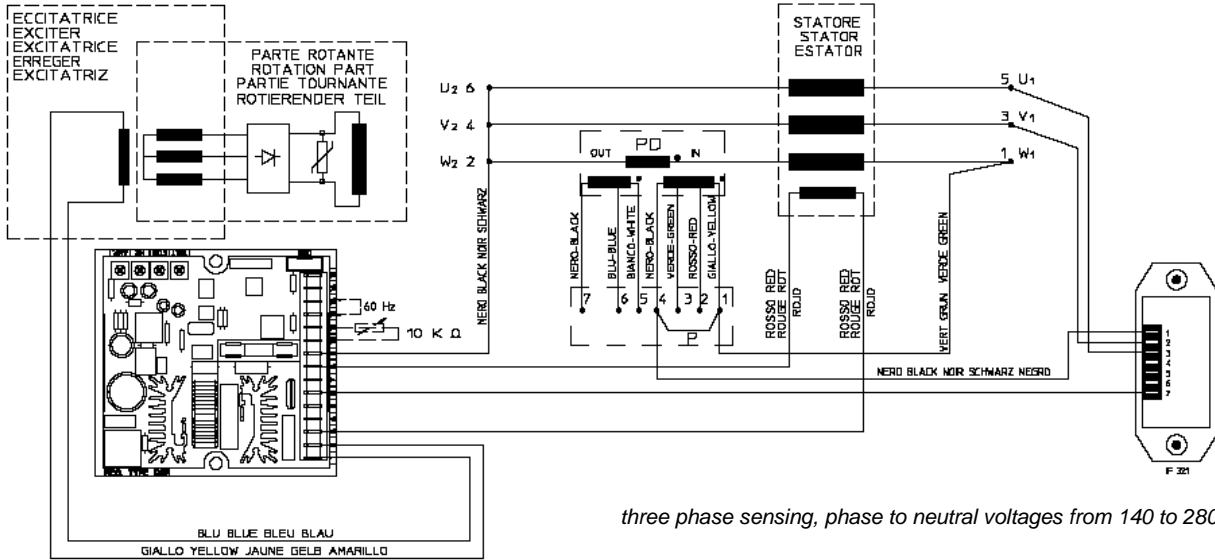


terminal 4 : sensing 140V / 280V

terminal 6 : sensing 70V / 140V

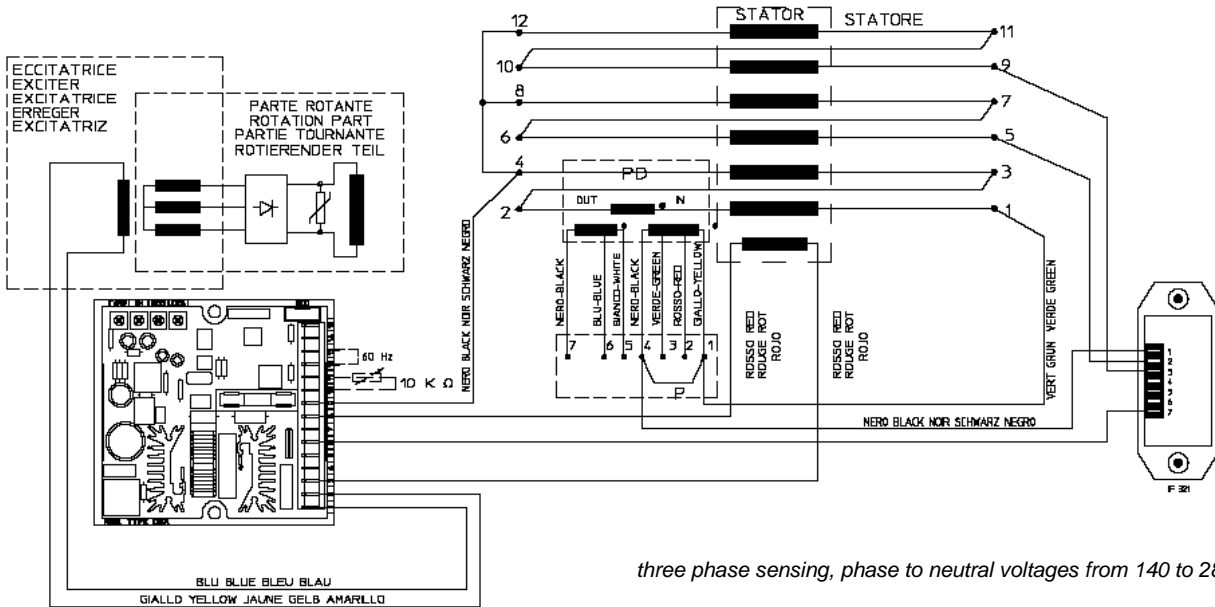
6 terminal alternators, three-phase sensing

SCC0104/00



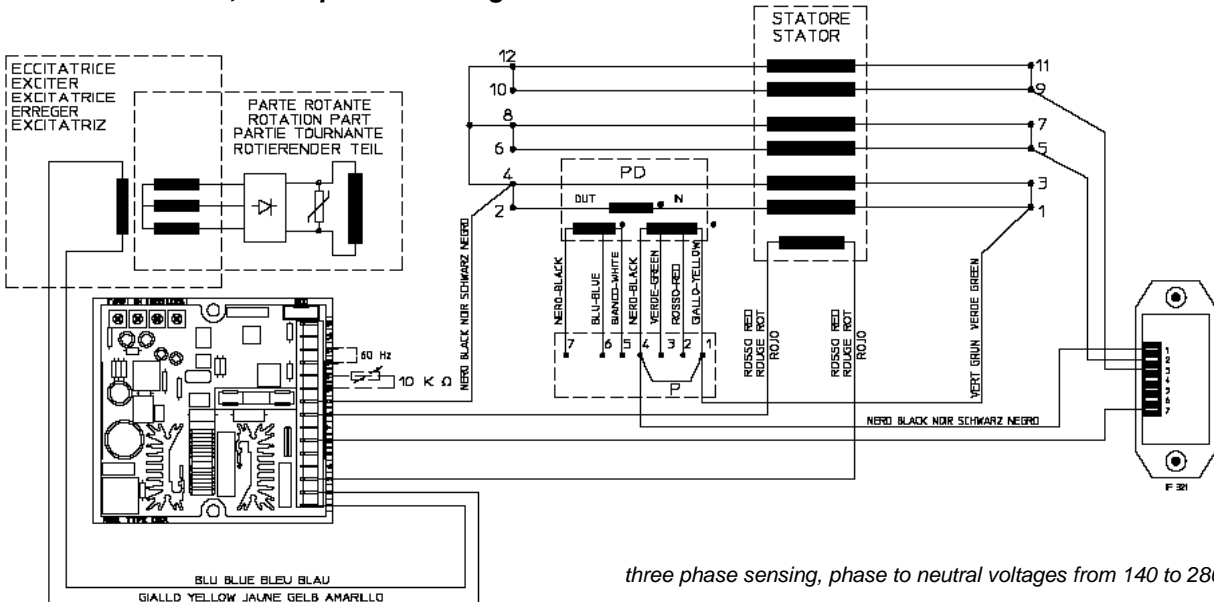
12 terminal alternators, three-phase sensing

SCC0106/00



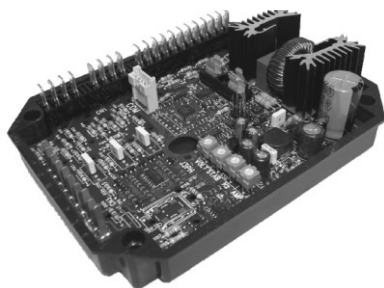
12 terminal alternators, three-phase sensing

SCC0105/00



DER1 APPENDIX

DER1 DIGITAL REGULATOR



Further information about DER1 regulator are available in the web site download area at following address :

www.meccalte.com

INSTALLATION

Upon receipt of the digital regulator, perform a visual inspection to ensure that no damage has been sustained during transportation and movement of the equipment. In the event of damage, advise the shipper, the insurance company, the seller or Mecc Alte immediately. If the regulator is not installed immediately, store it in its original packaging in a dust and humidity-free environment. The regulator is normally installed in the generator terminal box. It is fixed with two or M4x25 screws and must be installed in a location where the temperature does not exceed the environmental conditions foreseen.

CONNECTIONS

The digital regulator connections depend on the application and excitation system. **An error in connection may have serious consequences for the unit.** Carefully check to make sure that all connections are precise and in accordance with the attached drawings, before turning on the power.

TERMINALS

The connections must be made using cables having a minimum diameter :

- 1,5 mm² for power cables on terminals from 1 to 22
- 0,5 mm² for signal cables on terminals from 23 to 32

INPUTS AND OUTPUTS : TECHNICAL SPECIFICATIONS

TABLE 1 : CONNECTOR CN1				
Terminal ⁽¹⁾	Name	Function	Specification	Notes
1	Exc-	Excitation	Continuous rating: 4A _{dc} Transitory rating: 12A _{dc} at peak	
2	Aux/Exc+			
3	Aux/Exc+	Power	40÷270 Vac, Frequency: 12÷72Hz ⁽²⁾	(1)
4	UFG	Sensing range 2	Range 2: 150÷300 Vac Burden: <1VA	U channel
5	UFG			
6	UHG	Sensing range 1	Range 1: 75÷150 Vac Burden: <1VA	
7	UHG			
8	UHB	Jumper range 1		Short for sensing 75÷150 Vac
9	UFB			
10	UFB			
11	UFB		Board reference	Star point (12YY or 6Y leads generators) is hard connected to AVR power supply input ⁽¹⁾
12	UFB			
13	-		Not present	
14	VFG	Sensing range 1	Range 1: 75÷150 Vac Burden: <1VA	V channel, to be connected in parallel to U channel in case of single phase sensing.
15	VHG			
16	VHB	range 2	Range 2: 150÷300 Vac Burden: <1VA	
17	VFB			
18	-		Not present	
19	WFG	Sensing range 1	Range 1: 75÷150 Vac Burden: <1VA	W channel, unused (with shorted inputs) in case of single phase sensing.
20	WHG			
21	WHB	range 2	Range 2: 150÷300 Vac Burden: <1VA	
22	WFB			

Note 1) The terminals are connected to each other on the board: 2 with 3, 74 with 5, 6 with 7, 9 with 10, 11 and 12.

Note 2) Minimum power voltage 40Vac at 15Hz, 100V at 50Hz, 115V at 60Hz.

TABLE 2 : CONNECTOR CN3

Terminal	Name	Function	Specifications	Notes
23	Common	Active protections output	Type: Not insulated open collector Current: 100mA Voltage: 30V Max lenght: 30m ⁽³⁾	Both activating alarm and delay time are programmable.
24	A.P.O.			
25	Common	Jumper 50/60Hz	Type: Not insulated Max lenght: 3m	Selection of underspeed ⁽⁴⁾
26	50/60Hz			
27	0EXT	Jumper for remote voltage control 0÷2,5Vdc	Type: Not insulated Max lenght: 3m	Short for 0÷2,5Vdc input or potentiometer
28	JP1			
29	0EXT	Jumper for remote Input remote voltage control 0÷2,5Vdc or Pext	Type: Not insulated Max lenght: 3m ⁽³⁾	Regulation: ±10 % ⁽⁵⁾
30	PEXT			
31	JP2			
32	±10V	Pext Jumper control±10 Vdc	Type: Not insulated Max lenght: 3m Input: ±10Vdc	Short for 0÷2,5Vdc input or potentiometer Burden: ±1mA (source/sink)

Nota 3) With external EMI filter (3m without EMI filter)

Nota 4) $50 \cdot (100\% - \alpha Hz\%)$ o $60 \cdot (100\% - \alpha Hz\%)$ where $\alpha Hz\%$ is the position relative to the Hz trimmer or the percentage value of parameter P[21]

Nota 5) Value not to be exceeded. The effective range depends on parameter P[16]

DER1 regulator, on board of new generators, is already calibrated; in case of loose regulators (ie spare parts) or in case of wiring modifications or adjusting, to guarantee its correct working, it must be accurately set .

Basic settings can be done directly on the regulator by its four trimmers (VOLT - STAB - Hz - AMP), the jumper 50/60, JP1, JP2 and the Pext input. More detailed settings or measures can be done exclusively by software using for example the MeccAlte communication interface DI1 and the programs DSR_Terminal or DSR_Reader.

Remote control of voltage

The Pext input (terminal 30) and ±10V (terminal 32) allow to obtain remote control of the output voltage by means of a DC signal or an external potentiometer. The output voltage can be controlled by software as well with the P[19]. The excursion range and gain of the remote control can be set independently by software despite the output voltage control device system used (potentiometer, VDC signal or P[19]). If DC voltage is used, it will take effect if it is within the range 0Vdc/2,5Vdc or -10Vdc/+10Vdc, when connected between terminals 30 and 29 and subjected by jumpers JP1 and JP2; for values exceeding the aforementioned limits (or in the event of disconnection), two options are possible: not to take the set point of external input and return to regulation to the voltage value set with the trimmer (if enabled) or with parameter P[19], or keep the minimum (or maximum) value of voltage that can be reached (see figures 3a and 3b). The second option can be set only with the **RAM Voltage CTRL** flag in the configuration menu corresponding to the bit B7 of the configuration word P[10]. The setting relative to the Vext input are summarised in table 3.

NOTE: the source of DC voltage must be capable of absorbing at least 2 mA.

In making adjustments it is recommended not to exceed the nominal value of voltage of the alternator beyond ± 10%

Relationship between analogical input and output voltage

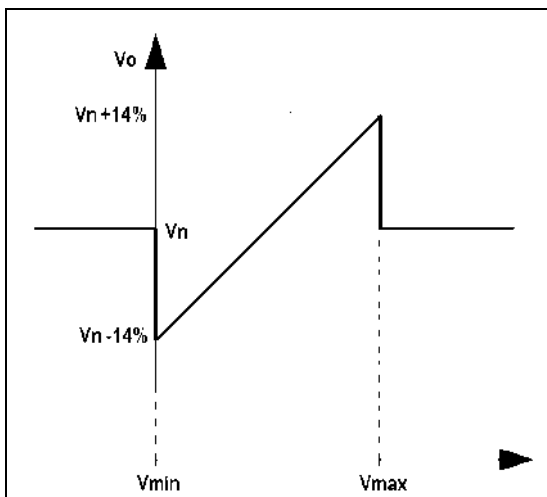


Figure 3a: without saturation of the output voltage upon reaching the input voltage limits

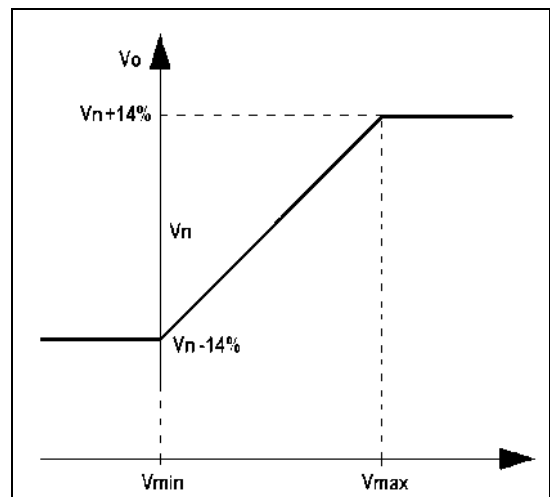
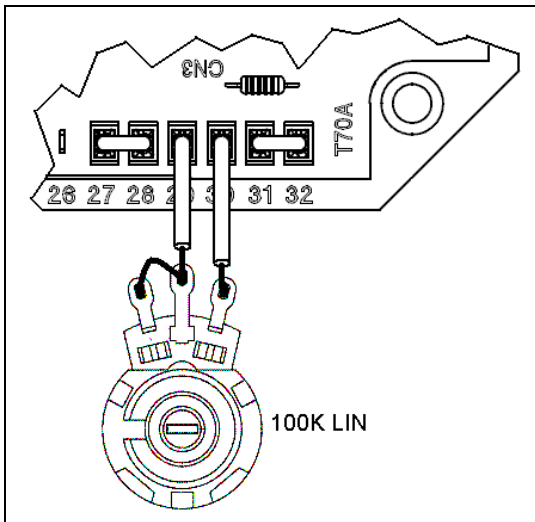
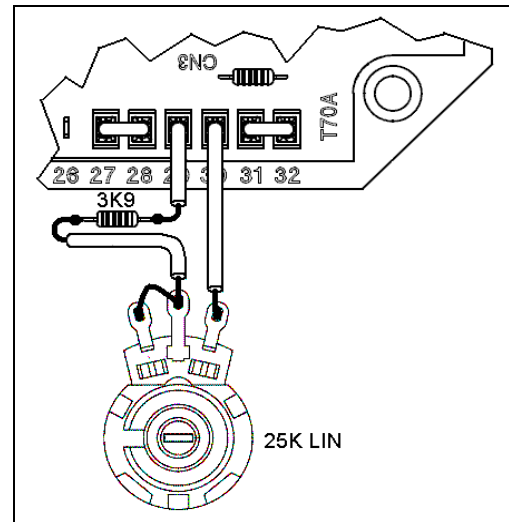


Figure 3b: with saturation of the output voltage upon reaching the input voltage limits

TABLE 3 : HARDWARE AND SOFTWARE CONFIGURATION OF VOLTAGE REMOTE CONTROL

Type	Input	Jumpers		Flags (Menu configuration) or Parameter P[10]	
		JP1 (27-28)	JP2 (31-32)	RAM Voltage CTRL	Ext. Input
Potentiometer	0Ext - Pext (29-30)	Close	Close	Disabled (Bit B7=0)	Enabled (Bit B12=1)
0V/2,5V without saturation	0Ext - Pext (29-30)	Close	Close	Disabled (Bit B7=0)	Enabled (Bit B12=1)
0V/2,5V with saturation	0Ext - Pext (29-30)	Close	Close	Enabled (Bit B7=1)	Enabled (Bit B12=1)
-10V/+10V without saturation	0Ext - ±10V (29-32)	Open	Open	Disabled (Bit B7=0)	Enabled (Bit B12=1)
-10V/+10V with saturation	0Ext - ±10V (29-32)	Open	Open	Enabled (Bit B7=1)	Enabled (Bit B12=1)
Parameter P[15]	EEPROM	Close	Close	Disabled (Bit B7=0)	Disabled (Bit B12=0)
Location L[49]	RAM	Close	Close	Enabled (Bit B7=1)	Disabled (Bit B12=0)

With a 100Kohm linear potentiometer connected as shown in figure 4a, you have the full excursion set with parameter P[16] (with the default value P[16]=4608 there is an excursion of $\pm 14\%$); with a 25Kohm linear potentiometer in series with a 3.9Kohm resistor, connected as shown in figure 4b, the effect of the external potentiometer is cut in half (with the default value P[16]=4608 there is an excursion of approximately $\pm 7\%$).


Figure 4a: 100K external potentiometer connection

Figure 4b: 25K external potentiometer connection

50/60 Signal

A jumper is located on the 50/60 input (terminals 25 and 26); it provokes the commutation of the underspeed protection threshold from 50·(100%-αHz%) to 60·(100%-αHz%), where αHz% represents the position relative to the Hz trimmer.

APO Contact

The acronym APO stands for Active Protection Output: terminals 23 (common) and 24 (collector) 30V-100mA non-insulated open collector transistor, normally opened, is closed (with a delay that can be programmed only by software from 1 to 15 seconds) when, among all the alarms, one or more of the active ones can be selected separately by software.

The **VOLT** trimmer allows adjustment from about 75V to about 150V when using for sensing terminals 6/7 - 10/11/12 (with bridge 8-9), 15-16 and 20-21, or from about 150V to about 300V when using terminals 4/5 - 9/10/11/12, 14-17 and 19-22.

The **STAB** trimmer adjusts the dynamic response (statism) of the alternator under transient conditions. Do not set this trimmer in a position lower than two notches counted counterclockwise.

The **AMP** trimmer adjusts the excitation overcurrent protection intervention threshold.

Use the following procedure in order to calibrate the overload protection:

- 1) Rotate the Hz trimmer entirely in the counter clockwise direction
- 2) Apply the nominal load to the alternator.
- 3) Decrease the speed by 10%
- 4) Two minutes later slowly rotate the AMP trimmer in the counter clockwise direction until there should be a decrease in the voltage value of the generator and alarm 5 should come on (visible due to a change in the flashing indicator light) .
- 5) Under these conditions, adjust the AMP trimmer, until the output voltage value is 97% of the nominal value: alarm 5 is still activated.
- 6) Return to the nominal speed; alarm 5 should disappear in a few seconds and the generator voltage should increase to the nominal value.
- 7) Adjust the trimmer as indicated in the following paragraph.

The Hz trimmer allows to calibrate the threshold of the intervention of the under frequency protection up to -20% with respect to the nominal speed value set by jumper 50/60 (at 50 Hz the threshold can be calibrated from 40 Hz to 50 Hz, at 60 Hz the threshold can be calibrated from 48 Hz to 60 Hz).

The intervention of this protection reduce the output generator voltage and, to calibrate it, use the following procedure :

- 1) Rotate the Hz trimmer entirely in the counter clockwise direction.
- 2) If the machine has to operate at 60 Hz, ensure that the bridge is inserted between terminals 25 and 26.
- 3) Bring the generator to 90% of the nominal speed.
- 4) Slowly turn the "Hz" trimmer, rotating it clockwise until the generator voltage begins to drop and ascertain that the indicator light simultaneously begins flashing rapidly.
- 5) By increasing speed, the generator voltage will normalise and the alarm will disappear.
- 6) Set the speed to the nominal value

During normal operation and a duty cycle of 50% (OK in fig. 5) an indicator light mounted on the board flashes every 2 seconds; it flashes differently in the event of intervention or alarm, as indicated in fig. 5.

NOTE: Notwithstanding DER1 maintains the voltage regulation, it goes in shutdown mode if the frequency decreases under 20Hz. The reset needs the Gen-Set switching off

N.	Description of event	Action
1	Checksum EEprom	Reset default, Blockage
2	Overvoltage	APO
3	Under voltage	APO
4	Short circuit	APO, Maximum current, Blockage
5	Excitation Overcurrent	APO, Reduction of excitation current
6	Underspeed	APO, Ramp V/F
7	Overspeed	APO

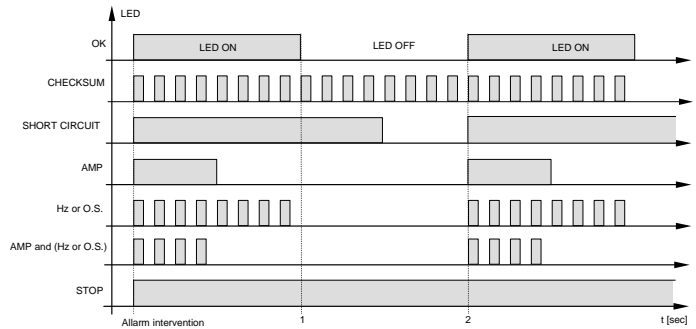
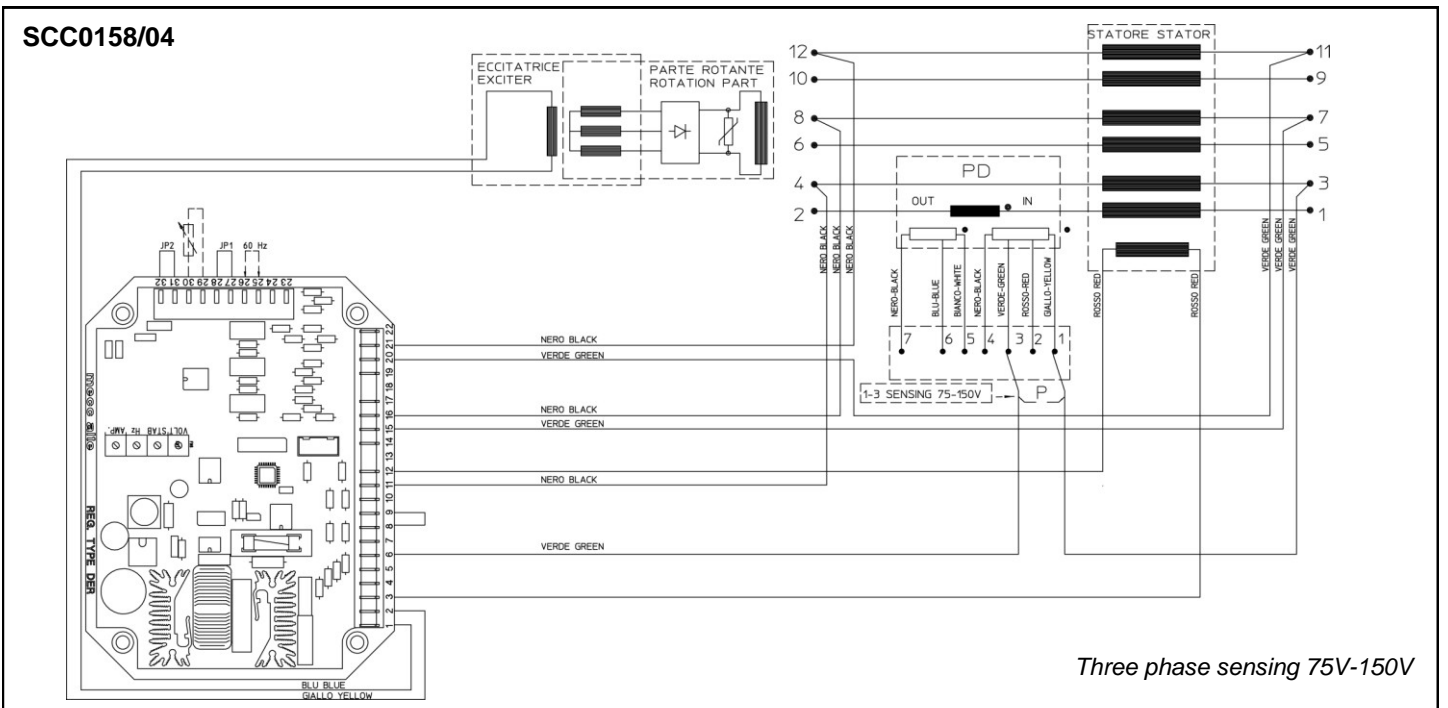
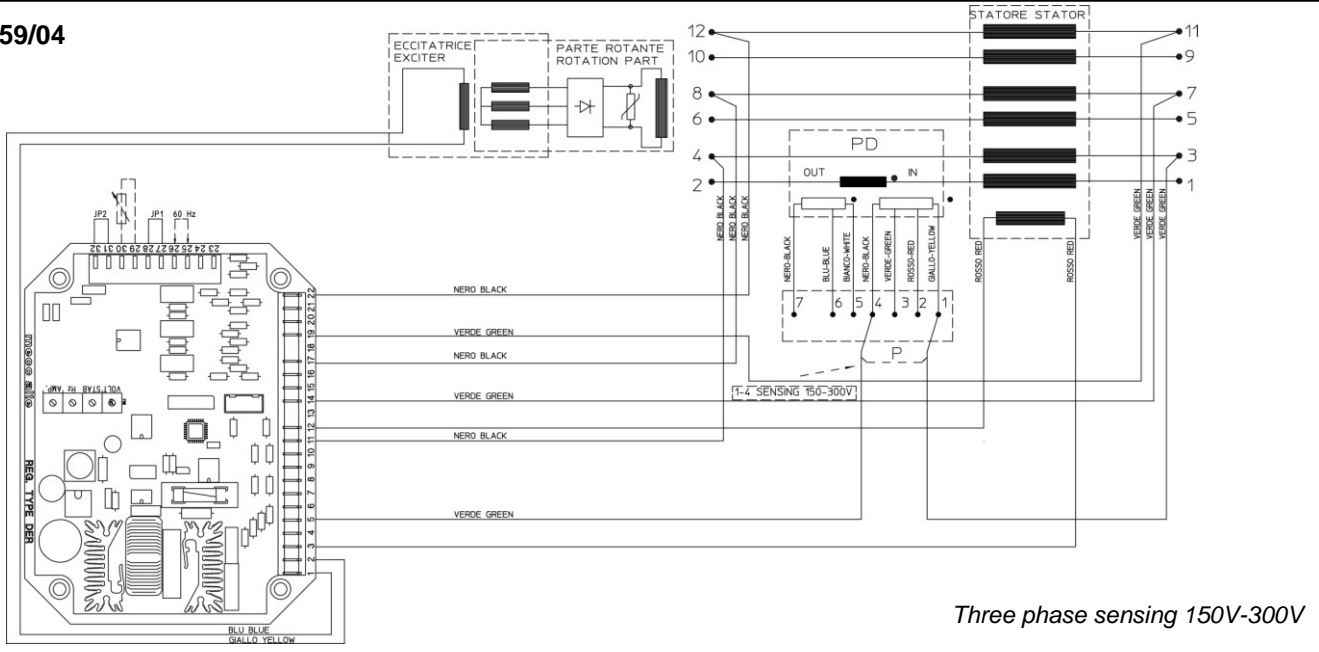


Fig. 5

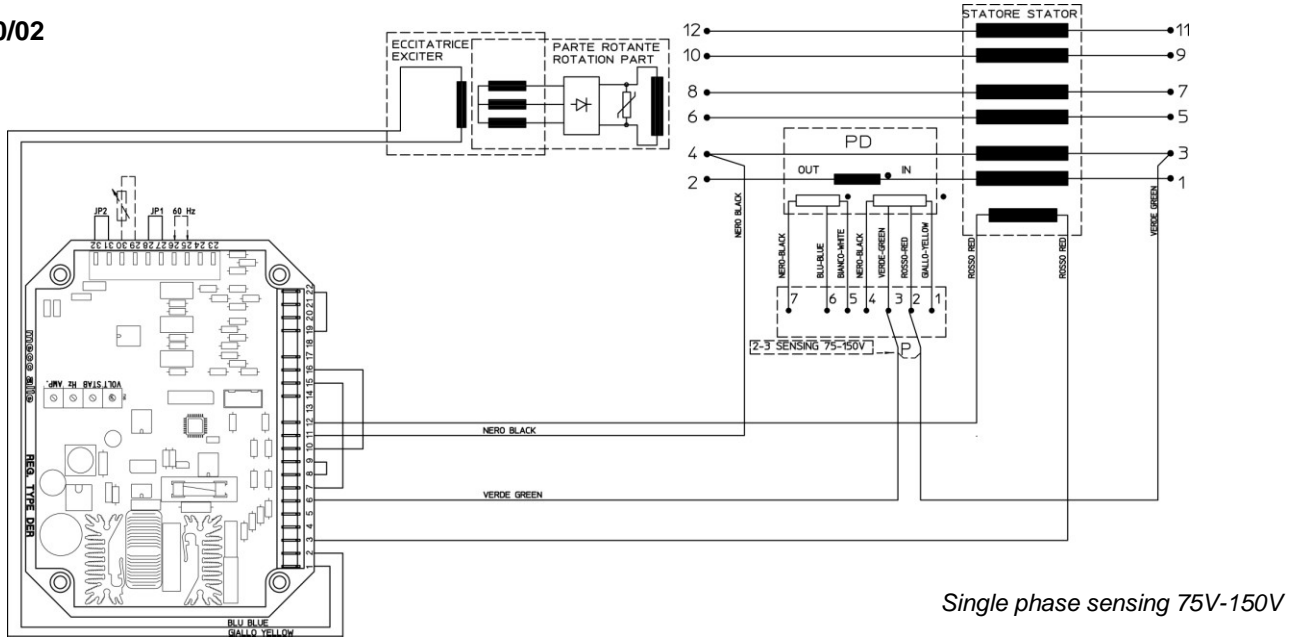


Three phase sensing 75V-150V

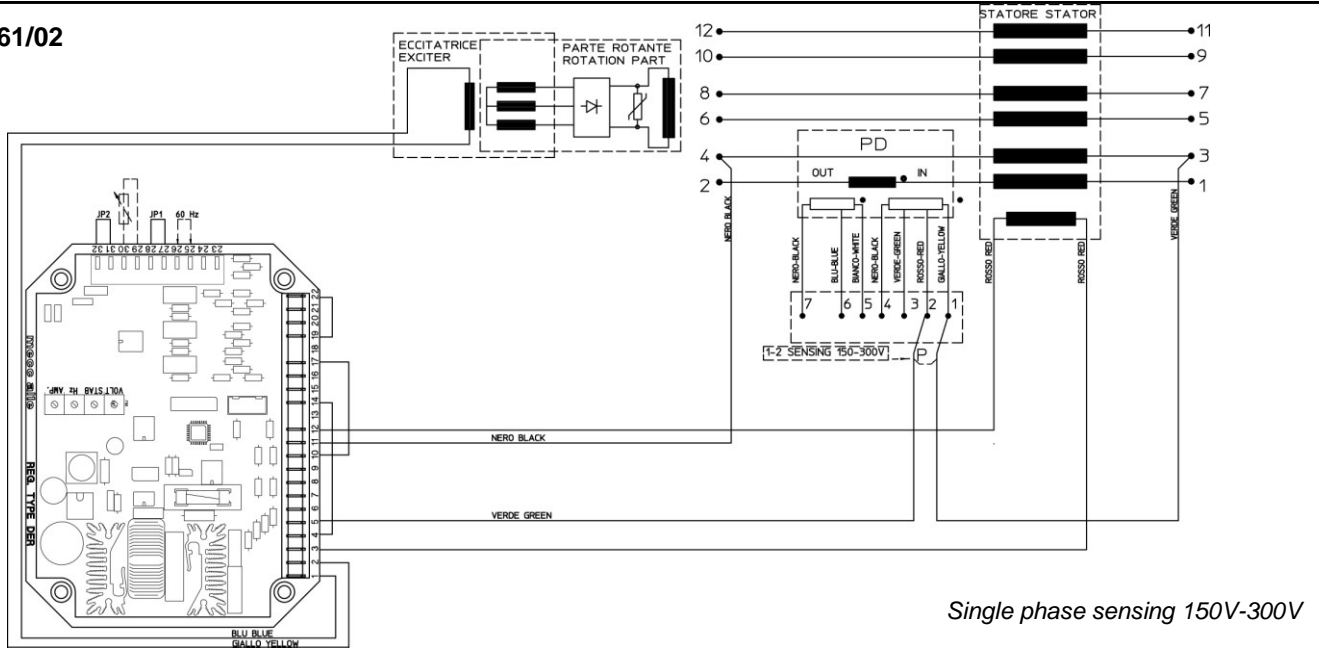
SCC0159/04

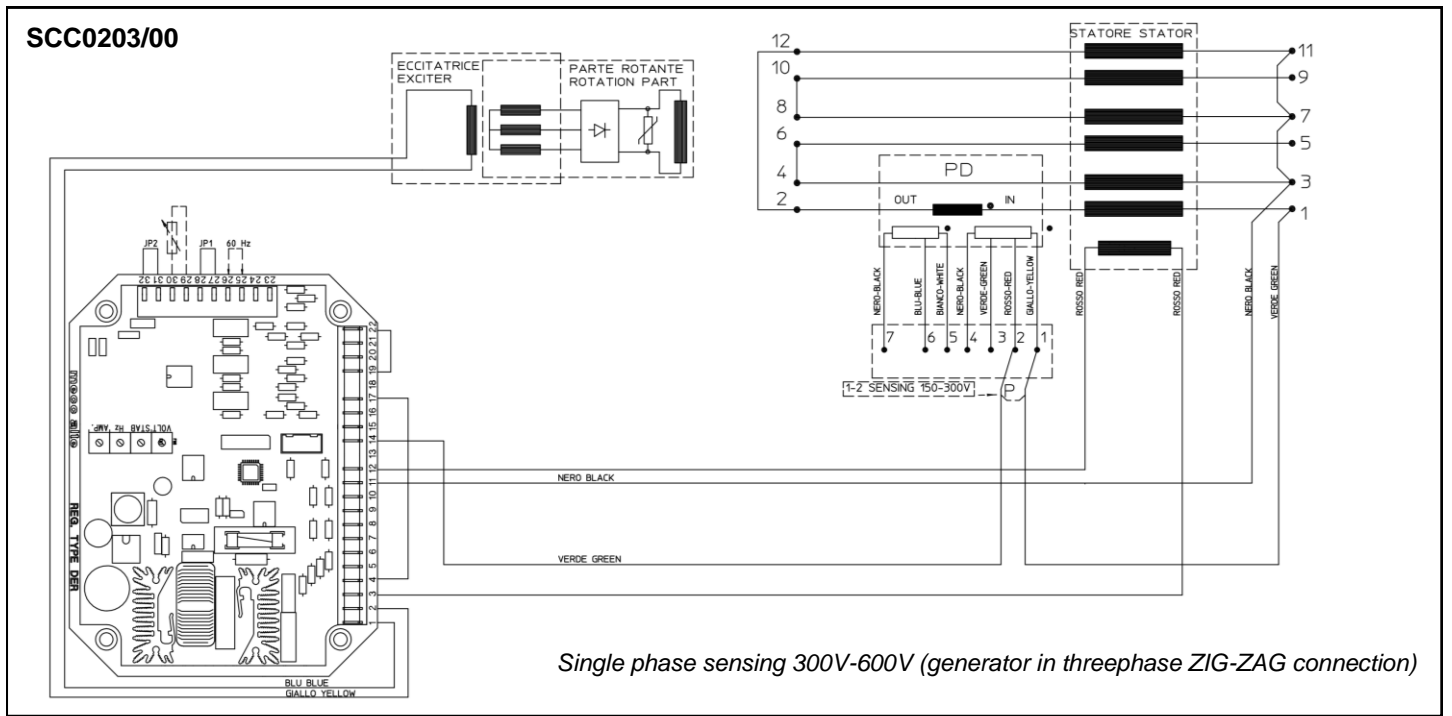
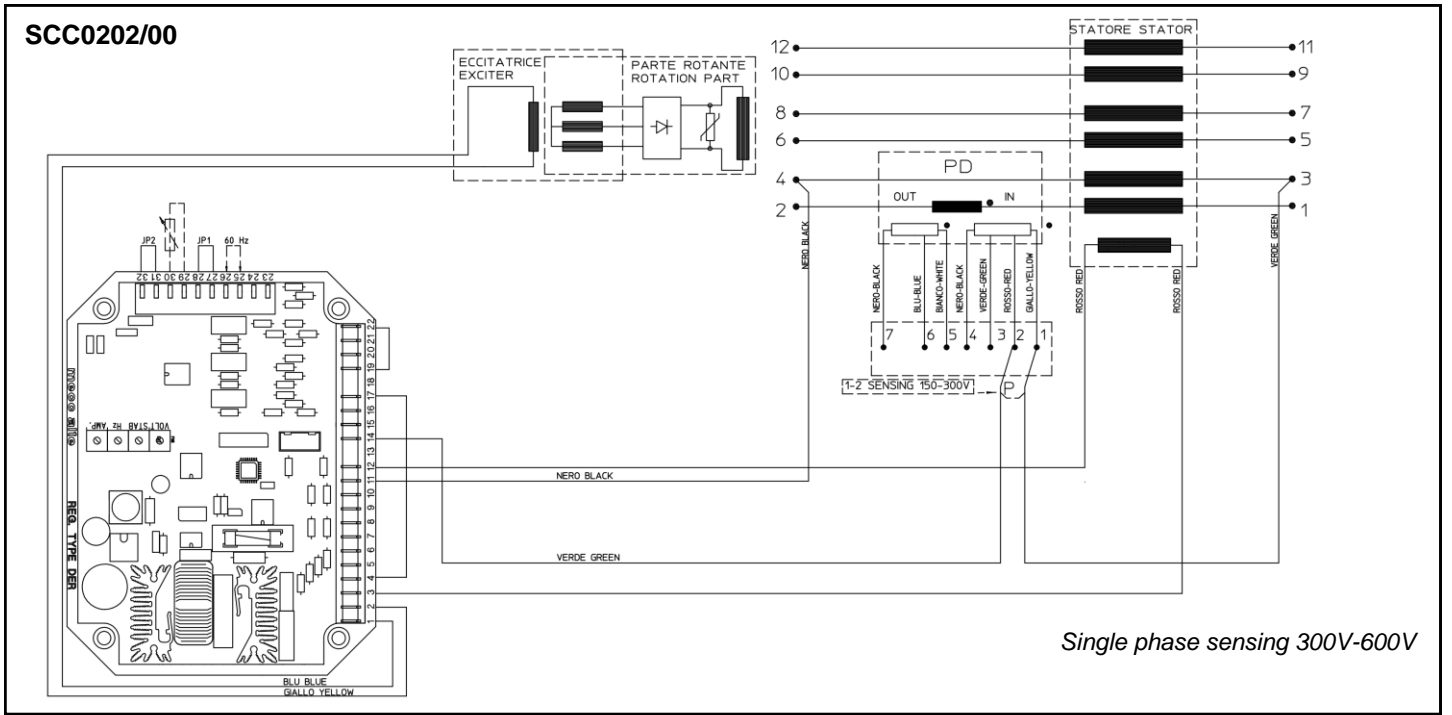


SCC0160/02



SCC0161/02





DER1 connections

The DER1 regulator has 3 differential inputs, with 2 selectable scales for each of them :

scale "H" for voltages between 75V and 150V

scale "F" for voltages between 150V and 300V

Connections based on main alternator voltage

Based on the machine connections, and the desired voltage⁽¹⁾ you can use the three phase or single phase sensing used in one range or the other. Table summarises the connections for the most common voltages

Connection	Phase-to-phase Voltage [V]	Sensing - Phase	Range	Drawing	Notes
Series star	380-400-415-440-460-480- 500 (from 260 to 500)	Single phase on half phase	H	SCC0160	
		Three phase on half phase	H	SCC0158	
		Single phase on full phase	F	N.D.	
		Three phase on full phase	F	N.D.	
	530-550-575-600-690-760- 800-920 -960(from 520 to 1000)	Single phase on half phase	F	SCC0161	
		Three phase on half phase	F	SCC0159	
1200 (from 1100 to 2000)	Single phase on half phase	F	SCC0202	2 channels in series	
Parallel star	190-200-208-220-230-240- 250 (from 130 to 250)	Single phase	H	SCC0160	
		Three phase	H	SCC0158	
	380-400-415-440-460-480- 500 (from 260 to 500)	Single phase	F	SCC0161	
		Three phase	F	SCC0159	
Series delta	220-230-240-254-265-277- 290 (from 150 to 300)	Single phase on half phase	H	SCC0160	
		Three phase on half phase	H	SCC0158	
	305-320-330-440-460-530- 555 (from 300 to 600)	Single phase on half phase	F	SCC0161	
		Three phase on half phase	F	SCC0159	
	220-230-240-254-265-277- 290 (from 150 to 300)	Single phase on full phase	F	N.D.	
		Three phase on full phase	F	N.D.	
Parallel delta	110-115-120-127-133-138- 145 (from 75 to 150)	Single phase	H	SCC0160	
		Three phase	H	SCC0158	
	152-160-165-220-230-265- 277 (from 150 to 300)	Single phase	F	SCC0161	
		Three phase	F	SCC0159	
Zig-Zag ⁽²⁾	330-346-360-380-400-415- 430 (from 260 to 500)	Single phase on full phase	F	N.D.	
		Three phase on full phase	F	SCC0203	2 channels in series
Single phase parallel	220-230-240-254-265-277- 290 (from 150 to 300)	Single phase - partial	H	SCC0160	
		Single phase - complete	F	N.D.	
	305-320-330-440-460-530- 555 (from 300 to 600)	Single phase - partial	F	SCC0161	
		Single phase - complete	F	N.D.	2 channels in series

(1) Compatibly with the rated characteristics of the alternator

(2) Sensing only on full phase