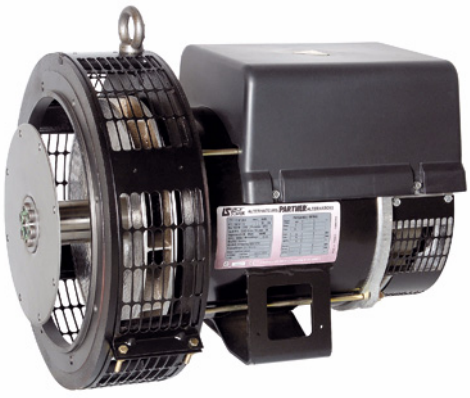
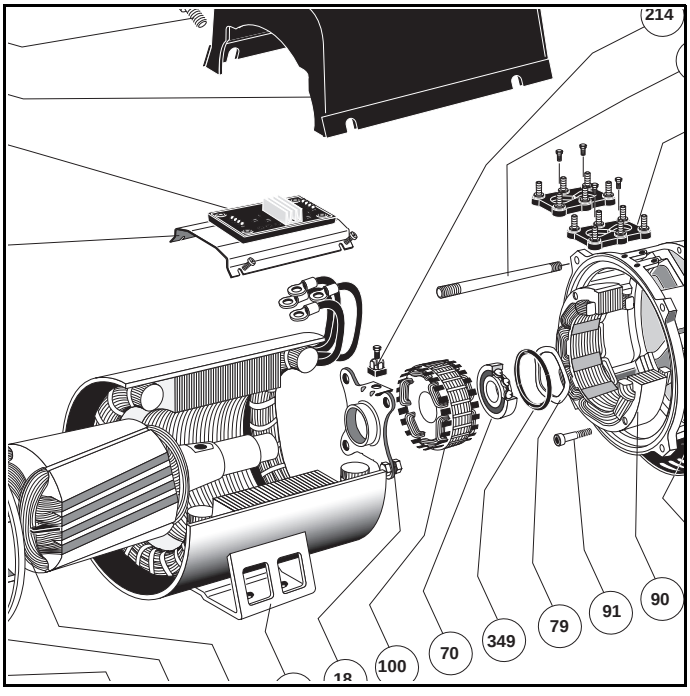
LEROY SOMER

Réf. 3548 en - 10.2007/c



This manual must be supplied to the end user



LSA 37 SHUNT - 2 & 4 POLE

ALTERNATORS

Installation and maintenance

LSA 37 SHUNT - 2 & 4 POLE
ALTERNATORS

This manual concerns the alternator which you have just purchased.

The latest addition to a whole new generation of alternators, this range benefits from the experience of the leading manufacturer worldwide, using advanced technology and incorporating strict quality control.

We wish to draw your attention to the contents of this maintenance manual. By following certain important points during installation, use and servicing of your alternator, you can look forward to many years of trouble-free operation.

SAFETY MEASURES

Before using your machine for the first time, it is important to read the whole of this installation and maintenance manual.

All necessary operations and interventions on this machine must be performed by a qualified technician.

Our technical support service will be pleased to provide any additional information you may require.

The various operations described in this manual are accompanied by recommendations or symbols to alert the user to potential risks of accidents. It is vital that you understand and take notice of the following warning symbols.

WARNING

Warning symbol for an operation capable of damaging or destroying the machine or surrounding equipment.

Warning symbol for general danger to personnel.

Warning symbol for electrical danger to personnel.

Note : LEROY-SOMER reserves the right to modify the characteristics of its products at any time in order to incorporate the latest technological developments. The information contained in this document may therefore be changed without notice.

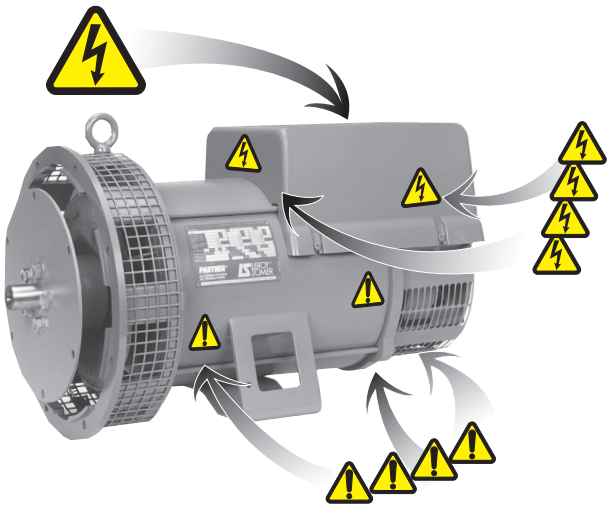
WARNING SYMBOLS

We draw your attention to the following two safety measures which must be complied with:

a) During operation, do not allow anyone to stand in front of the air outlet guards, in case anything is ejected from them.

b) Do not allow children younger than 14 to go near the air outlet guards.

A set of self-adhesive stickers depicting the various warning symbols is included with this maintenance manual. They should be positioned as shown in the drawing below once the machine has been fully installed.



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ALTERNATORS
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EC DECLARATION OF INCORPORATION

LSA 37 SHUNT - 2 & 4 POLE
ALTERNATORS
RECEIPT

1 - RECEIPT

1.1 - Standards and safety measures

Our alternators comply with most international standards and are compatible with :
- the recommendations of the
International Electrotechnical Commission
IEC 6034-1 (EN 60034).
- the recommendations of the
International Standards Organisation ISO 8528.
- the European Community directive 89/336/EEC on Electromagnetic Compatibility (EMC).
- the European Community directives 73/23/EEC and 93/68/EEC (Low Voltage Directive).
They are CE marked with regard to the LVD (Low Voltage Directive) in their role as a machine component. A declaration of incorporation can be supplied on request.

1.2 - Inspection

On receipt of your alternator, check that it has not suffered any damage in transit. If there are obvious signs of knocks, contact the transporter (you may able to claim on their insurance) and after a visual check, turn the machine by hand to detect any malfunction.

1.3 - Identification

The alternator is identified by means of a nameplate fixed on the frame.
Make sure that the nameplate on the machine conforms to your order.
The machine name is defined according to various criteria (see below).
Example of description for : **LSA 37 M5 J1/4**
- LSA : name used in the PARTNER range
  M : Marine / C : Cogeneration / T : Telecommunications.
- 37 : machine type
- M5 : model
- J : field excitation system (J : SHUNT)
- 1/4 : winding number / number of poles.

1.3.1 - Nameplate

So that you can identify your machine quickly and accurately, we suggest you fill in its specifications on the nameplate below.

1.4 - Storage

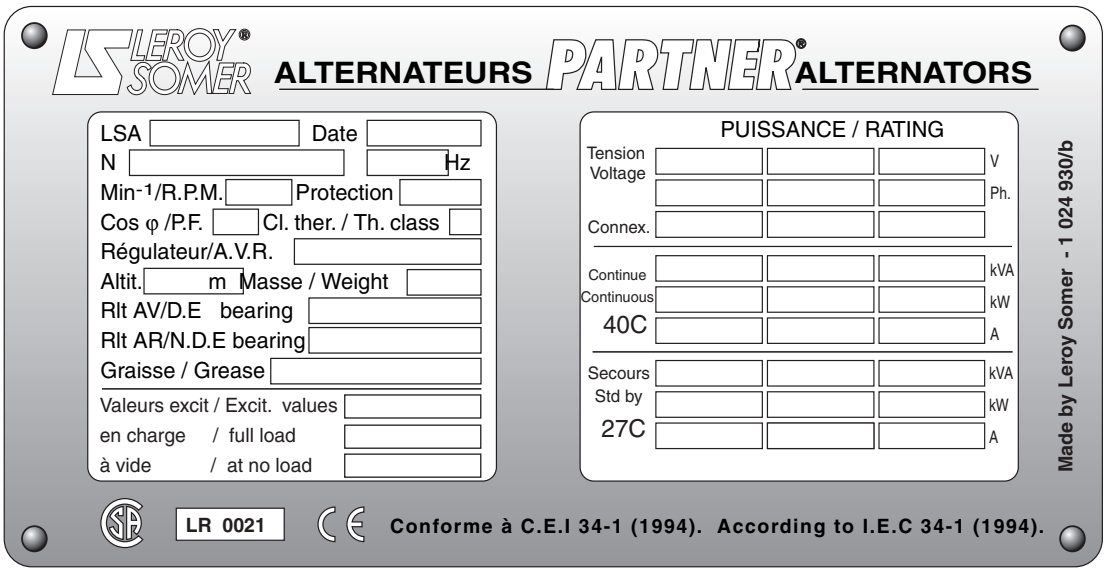
Prior to commissioning, machines should be stored :
- Away from humidity : in conditions of relative humidity of more than 90%, the machine insulation can drop very rapidly, to just above zero at around 100%; monitor the state of the anti-rust protection on unpainted parts.
For storage over an extended period, the machine can be placed in a sealed enclosure (heatshrunk plastic for example) with dehydrating sachets inside, away from significant and frequent variations in temperature to avoid the risk of condensation during storage.
- If the area is affected by vibration, try to reduce the effect of these vibrations by placing the generator on a damper support (rubber disc or similar) and turn the rotor a fraction of a turn once a fortnight to avoid marking the bearing rings.

1.5 - Applications

These alternators are mainly designed to produce electricity in the context of applications involving the use of generators.

1.6 - Contraindications to use

Use of the machine is restricted to operating conditions (environment, speed, voltage, power, etc) compatible with the characteristics indicated on the nameplate.

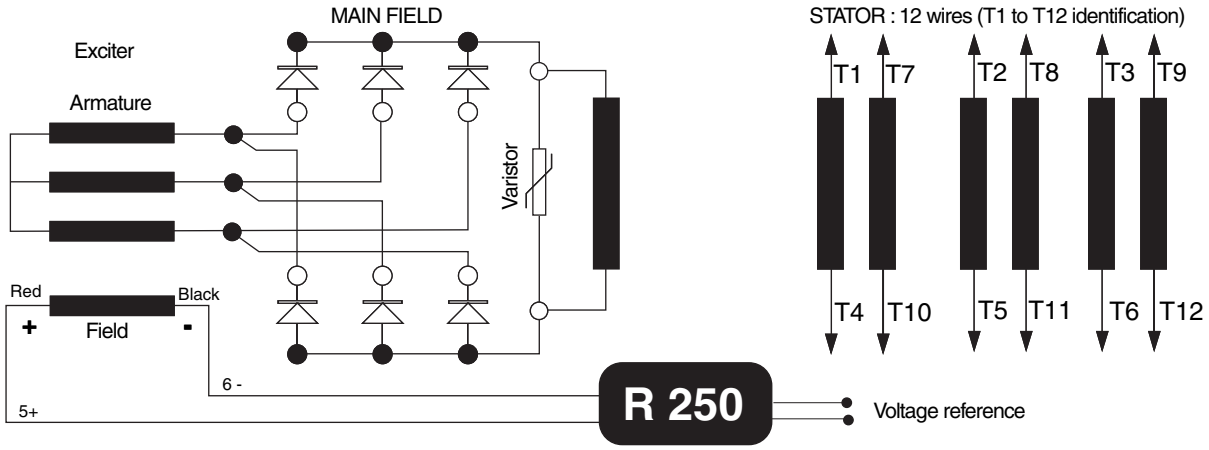


LSA 37 SHUNT - 2 & 4 POLE
ALTERNATORS
TECHNICAL CHARACTERISTICS

2 - TECHNICAL CHARACTERISTICS

2.1 - Electrical characteristics

The PARTNER LSA 37 alternator is a machine without sliprings and revolving field brushes, wound as "2/3 pitch"; 12 wire (2 poles), or "full pitch" 12 wire (4 pole) with class H insulation and a field excitation system available in "SHUNT" version (see sections 2.3,). Interference suppression conforms with standard EN 55011, group 1, class B.



2.1.1 - Options

- Stator temperature detection probes.
- Space heaters.

2.2 - Mechanical characteristics

- Steel frame
- End shields in cast iron
- Greasable ball bearings
- Mounting arrangement

MD 35 :
single bearing with standard feet and SAE flanges/coupling discs.
B 34 :
two-bearing with SAE flange and standard cylindrical shaft extension.
- Drip-proof machine, self-cooled
- Degree of protection : IP 23

2.2.1 - Options

- Protection against harsh environments
- Air inlet filter, air outlet labyrinth seals.

Alternators fitted with air inlet filters should be derated by 5% (power).
To prevent excessive temperature rise caused by clogged filters, it is advisable to fit the stator winding with thermal sensors (PTC or PT100).

3 - INSTALLATION

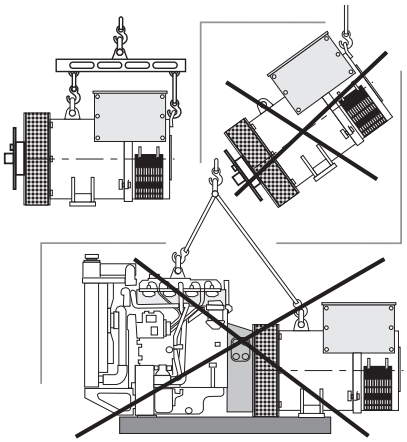
Personnel undertaking the various operations indicated in this section must wear personal protective equipment appropriate for mechanical and electrical hazards.

3.1 - Assembly

All mechanical handling operations must be undertaken using approved equipment and the machine must be horizontal. Check how much the machine weighs (see 4.8.5) before choosing the lifting tool.
During this operation, do not allow anyone to stand under the load.

3.1.1 - Handling

The generously-sized lifting rings are for handling the alternator alone. They must not be used to lift the genset. The choice of lifting hooks or handles should be determined by the shape of these rings. Choose a lifting system which respects the integrity and the environment of the alternators.



3.1.2 - Coupling

3.1.2.1 - single bearing alternator
Before coupling to the prime mover, check that both are compatible by:
- Undertaking a torsional analysis of the transmission.
-Checking the dimensions of the flywheel and its housing, the flange, coupling discs and offset.

WARNING

When coupling the alternator to the prime mover, the holes of the coupling discs should be aligned with the flywheel holes by cranking the engine.
Do not use the alternator fan to turn the rotor. Make sure the alternator is securely bedded in position during coupling.
Tighten the coupling discs screws to the recommended torque (see section 4.6.2.) and check that there is lateral play on the crankshaft.

3.1.2.2 - two-bearing alternator
- Semi-flexible coupling
Careful alignement of the machines by measuring the concentricity and parallelism of the two parts of the coupling is recommended, the difference between the teadings should not exceed the specified values (say 0,1 mm).

WARNING

This alternator has been balanced with a 1/2 key.

3.1.3 - Location

Ensure that the ambient temperature in the room where the alternator is placed cannot exceed 40°C for standard power ratings (for temperatures above 40°C, apply a derating coefficient). Fresh air, free from damp and dust, must be able to circulate freely around the air input louvres on the opposite side from the coupling. The alternator air outlet guard must not face any points of access to the room (entrance door, room ventillation grille).

3.2 - Inspection prior to first use

3.2.1 - Electrical checks

Under no circumstances should an alternator, new or otherwise, be operated if the isolation is less than 1 megohm for the stator and 100,000 ohms for the other windings.
There are two possible methods for restoring the above minimum values.
a) Dry out the machine for 24 hours in a drying oven at a temperature of approximately 110 °C.
b) Blow hot air into the air input, having made sure that the machine is rotating with the exciter field disconnected.
c) Run in short-circuit mode (disconnect the AVR)
- Short-circuit the output phases using connections capable of supporting the rated current (try not to exceed 6 A/mm2).
- Insert a clamp ammeter to monitor the current passing through the short-circuit connections.
- Connect a 48 Volt battery in series with a rheostat of approximately 10 ohms (50 Watts), to the exciter field terminals, respecting the polarity.
- Open fully all the alternator orifices.
- Run the alternator at rated speed . Adjust the exciter field current using the rheostat to obtain the rated output current in the short-circuit connections.
Note: Prolonged standstill: In order to avoid these problems, we recommend the use of space heaters, as well as turning over the machine from time to time. Space heaters are only really effective if they are working continuously while the machine is stopped.

LSA 37 SHUNT - 2 & 4 POLE
ALTERNATORS
INSTALLATION

3.2.2 - Physical and visual checks

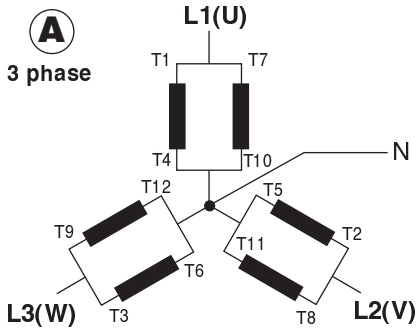
Before starting the machine for the first time, check that:
- the fixing bolts on the feet are tight
- the cooling air is drawn in freely
- the protective louvres and housing are correctly in place
- the standard direction of rotation is clockwise as seen from the shaft end (phase rotation in order 1 - 2 - 3). For anti-clockwise rotation, swap 2 and 3.
- the winding connection corresponds to the site operating voltage (see section § 3.3)

3.3 - Terminal connection diagrams

To modify the connection, change the position of the terminal cables. The winding code is specified on the nameplate.

Any intervention on the alternator terminals during reconnection or checks should be performed with the machine stopped.

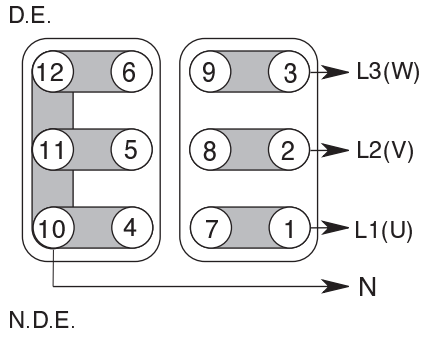
Connection code A — 3 phase



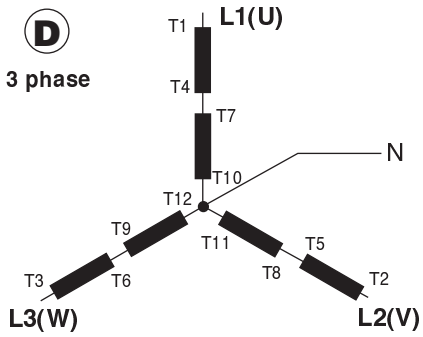
Winding	50 Hz	60 Hz
1 or 6	190 - 208	190 - 240
2 or 7	220 - 230	-
3 or 8	-	190 - 208

R 250 voltage detection :
0 => (T8) / 110 V => (T11)

Factory connection



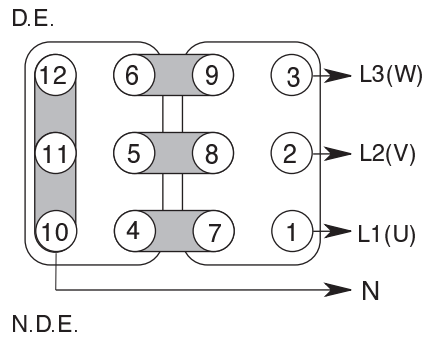
Connection code D — 3 phase



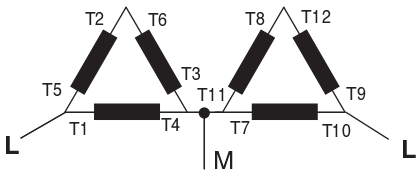
Winding	50 Hz	60 Hz
1 or 6	380 - 415	380 - 480
2 or 7	440 - 460	-
3 or 8	-	380 - 416

R 250 voltage detection :
0 => (T8) / 110 V => (T11)

Factory connection



Connection code FF — 1 phase

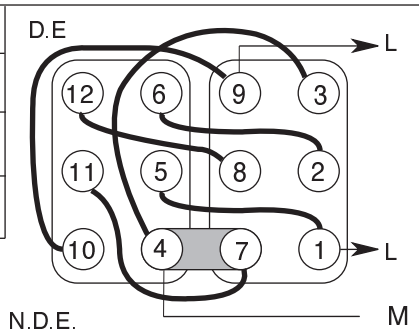


Voltage LM = 1/2 voltage LL

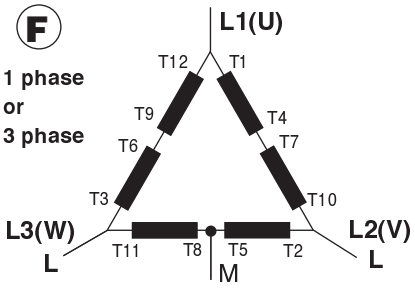
Winding	50 Hz	60 Hz
1 or 6	220 - 240	220 - 240
2 or 7	250 - 260	-
3 or 8	200	220 - 240

R 250 voltage detection :
0 => (T1) / 110 V => (T4)

Factory connection



Connection code F — 1 phase or 3 phase

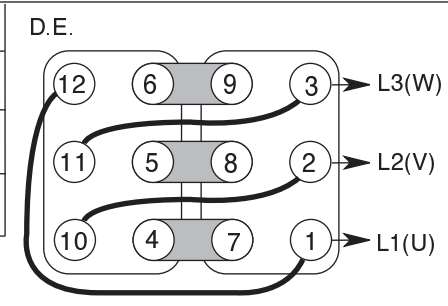


Voltage LM = 1/2 voltage LL

Winding	50 Hz	60 Hz
1 or 6	220 - 240	220 - 240
2 or 7	250 - 260	-
3 or 8	200	220 - 240

R 250 voltage detection :
0 => (T8) / 110 V => (T11)

Factory connection

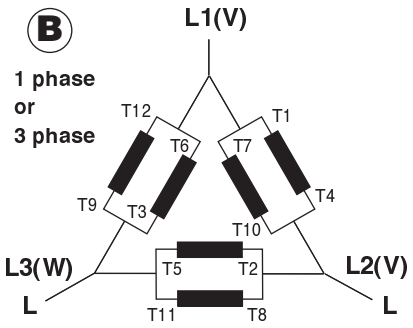


LSA 37 SHUNT - 2 & 4 POLE
ALTERNATORS
INSTALLATION

Connection codes

B

1 phase
or
3 phase

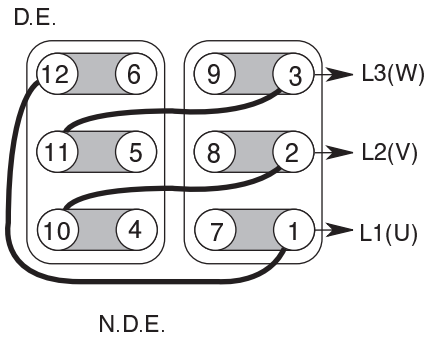


L.L voltage

Winding	50 Hz	60 Hz
1 or 6	110 - 120	120
2 or 7	120 - 130	-
3 or 8	-	110 - 120

R 250 voltage detection :
0 => (T8) / 110 V => (T11)

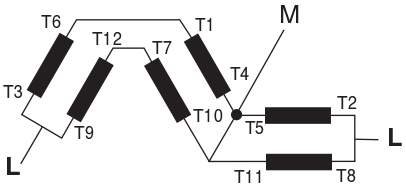
Factory connection



G

Connection not recommended

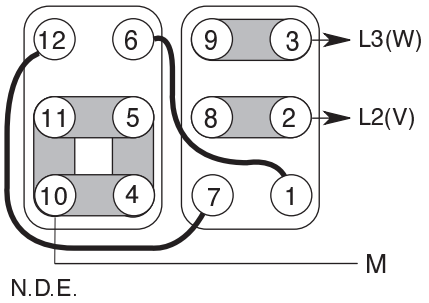
1 PH



LM voltage = 1/2 LL voltage

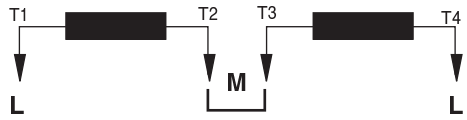
Winding	50 Hz	60 Hz
1 or 6	220 - 240	220 - 240
2 or 7	250 - 260	-
3 or 8	200	220 - 240

R 250 voltage detection :
0 => (T8) / 110 V => (T11)



SINGLE PHASE 4 LEADS - WINDING DEDICATED type M or M1

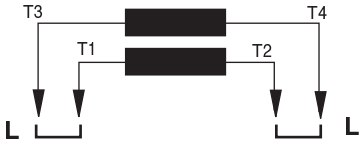
SERIES CONNECTION



Voltage 50/60 Hz			Output		
L - L	L - M	Connect	L	L	M
220 230 240	110 115 120	T2 - T3	T1	T4	T2 - T3

R 250 voltage detection : 0 => (T1) / 110 V => (T2)

PARALLEL CONNECTION

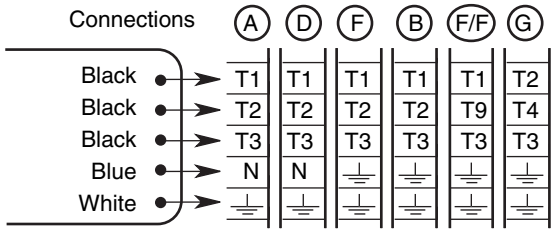


Voltage 50/60 Hz			Output		
L - L	L - M	Connect	L	L	M
110 115 120	- - -	T1 - T3 T2 - T4	T1-T3	T2 - T4	-

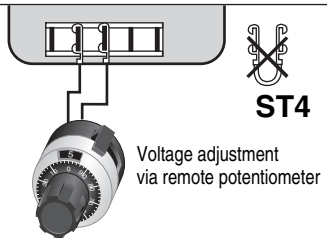
R 250 voltage detection : 0 => (T1) / 110 V => (T2)

3.3.1 - Connection diagram for options

R 791 T interference suppression kit (standard for CE marking)



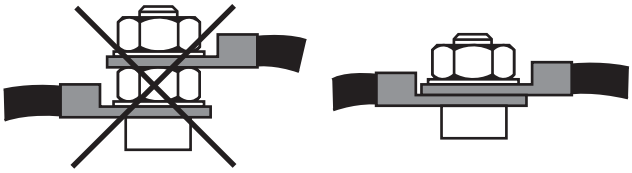
Voltage potentiometer



3.3.2 - Connection checks

Electrical installations must comply with the current legislation in force in the country of use.

Check that:
- the differential circuit-breaker conforms to legislation on protection of personnel, in force in the country of use, and has been correctly installed on the alternator power output as close as possible to the alternator. (Disconnect the blue wire of the R 791 interference suppression module linking the neutral).
- any protective devices in place have not tripped,
- if there is an external regulator, the connections between the alternator and the cubicle are made in accordance with the connection diagram,
- there is no short-circuit between phase or phase-neutral between the alternator output terminals and the generator set control cabinet (part of the circuit not protected by circuit-breakers or cubicle relays)
- the machine should be connected with the terminal lugs on top of one another as shown in the terminal connection diagrams.
- The earth terminal (ref 28) is connected to the electrical earth circuit.



3.4 - Commissioning

The machine can only be started up and used if the installation is in accordance with the instructions and advice defined in this manual.
The machine is tested and set at the factory. When first used with no load, make sure that the drive speed is correct and stable (see the nameplate). On application of the load, the machine should maintain its rated speed and voltage; however, in the event of abnormal operation, the machine setting can be altered (follow the adjustment procedure in section 3.5). If the machine still operates incorrectly, the cause of the malfunction must be located (see section 4.4).

3.5 - Setting up

The various adjustments during tests must be made by a qualified engineer. Take care that the drive speed specified on the nameplate is reached before commencing adjustment. After operational testing, replace all access panels or covers.
The A.V.R. is used to make any adjustments to the machine.

4 - SERVICING - MAINTENANCE

4.1 - Safety measures

Servicing or troubleshooting must be carried out strictly in accordance with instructions so as to avoid the risk of accidents and to maintain the machine in its original state.

All such operations performed on the alternator should be undertaken by personnel trained in the commissioning, servicing and maintenance of electrical and mechanical components, who must wear personal protective equipment appropriate for mechanical and electrical hazards.
Before any intervention on the machine, ensure that it cannot be started by a manual or automatic system and that you have understood the operating principles of the system.

4.2 - Regular maintenance

4.2.1 - Checks after start-up

After approximately 20 hours of operation, check that all fixing screws on the machine are still tight, plus the general state of the machine and the various electrical connections in the installation.

4.2.2 - Cooling circuit

It is advisable to check that circulation of air is not reduced by partial blocking of the air intake and outlet grilles : mud, fibre, grease, etc.

4.2.3 - Bearings

The bearings are greased for life: approximate life of the grease (depending on use) = 20,000 hours or 3 years. Monitor the temperature rise in the bearings, which should not exceed 90°C above the ambient temperature. Should this value be exceeded, the machine must be stopped and checks carried out.

4.2.4 - Electrical servicing

Cleaning product for the windings

WARNING

Do not use : trichlorethylene, perchlorethylene, trichloroethane or any alkaline products.

Certain strictly defined pure volatile degreasing products can be used, such as :

- Normal petrol (without additives) ; inflammable
- Toluene (slightly toxic); inflammable
- Benzene (or benzine, toxic); inflammable
- Ciclohexare (non toxic); inflammable

Cleaning of the stator, rotor, exciter and diode bridge

These operations must be performed at a cleaning station, equipped with a vacuum system that collects and flushes out the products used.
The insulating components and the impregnation system are not at risk of damage from solvents (see the list of authorised products).
Avoid letting the cleaning product run into the slots. Apply the product with a brush, sponging frequently to avoid accumulation in the housing. Dry the winding with a dry cloth. Let any traces evaporate before reassembling the machine.

4.2.5 - Mechanical servicing

WARNING

Cleaning the machine using water or a high-pressure washer is strictly prohibited.
Any problems arising from such treatment are not covered by our warranty.
Degreasing : Use a brush and detergent (suitable for paintwork).
Dusting : Use an air gun.
If filters have been added to the machine after manufacture and do not have thermal protection, the service personnel should clean the air filters periodically and systematically, as often as necessary (every day in very dusty atmospheres).
Cleaning can be performed using water for dry dust or in a bath containing soap or detergent in the case of greasy dust. Petrol or chloroethylene can also be used.
After cleaning the alternator, it is essential to check the winding insulation (see sections 3.2. and 4.7.).

4.3 - Fault detection

If, when commissioned, the alternator does not work normally, the source of the malfunction must be identified. To do this, check that :
- the protective devices are fitted correctly
- the connections comply with diagrams in the manuals supplied with the machine
- the speed of the unit is correct (see section 1.3).
Repeat the operations defined in section 3.

4.4 - MECHANICAL FAULTS

Fault		Cause
Bearing	Excessive overheating of one or both bearings (bearing temperature 80°C above the ambient temperature) (With or without abnormal bearing noise)	- If the bearing has turned blue or if the grease has turned black, change the bearing. - Bearing not fully locked (abnormal play in the bearing cage) - End shields incorrectly aligned
Abnormal temperature	Excessive overheating of alternator frame (more than 40° C above the ambient temperature)	- Air flow (inlet-outlet) partially clogged or hot air is being recycled from the alternator or engine - Alternator operating at too high a voltage (> 105% of Un on load) - Alternator overloaded
Vibrations	Too much vibration	- Misalignment (coupling) - Defective mounting or play in coupling - Rotor balancing fault (Engine - Alternator)
	Excessive vibration and humming noise coming from the machine	- Phase imbalance - Stator short-circuit
Abnormal noise	Alternator damaged by a significant impact, followed by humming and vibration	- System short-circuit - Misparalleling Possible consequences - Broken or damaged coupling - Broken or bent shaft end - Shifting and short-circuit of main field - Fan fractured or coming loose on shaft - Irreparable damage to rotating diodes/AVR

4.5 - Electrical faults

Fault	Action	Effect	Check/Cause
No voltage at no load on start-up	Connect a new battery of 4 to 12 volts to terminals E- and E+, respecting the polarity, for 2 to 3 seconds	The alternator builds up and its voltage is still correct when the battery is removed.	- Lack of residual magnetism
		The alternator builds up but its voltage does not reach the rated value when the battery is removed.	- Check the connection of the voltage reference to the AVR - Faulty diode - Armature short-circuit
		The alternator builds up but its voltage disappears when the battery is removed.	- Faulty AVR - Field windings open circuit (check winding) - Main field winding open circuit (check the resistance)
Voltage too low	Check the drive speed	Correct speed	Check the AVR connections (possible AVR failure) - Field windings short-circuited - Rotating diodes burnt out - Main field winding short-circuited - Check the resistance
		Speed too low	Increase the drive speed (Do not touch the AVR voltage pot. (P2) before running at the correct speed.)
Voltage too high	Adjust AVR voltage potentiometer	Adjustment ineffective	Faulty AVR
Voltage oscillations	Adjust AVR stability potentiometer	If no effect : try normal / fast recovery modes (ST2)	- Check the speed : possibility of cyclic irregularity - Loose connections - Faulty AVR - Speed too low when on load (or LAM set too high)
Voltage correct at no load and too low when on load (*)	Run at no load and check the voltage between E+ et E- on the AVR	Voltage between E+ and E– SHUNT < 6V	- Check the speed (or LAM set too high)
		Voltage between E+ and E– SHUNT > 10V	- Faulty rotating diodes - Short-circuit in the main field. Check the resistance. - Faulty exciter armature. Check the resistance.
(*) Warning : During single-phase operation, check that the sensing wires from the AVR are connected to the correct output terminals.			
Voltage disappears during operation	Check the AVR, the surge suppressor, the rotating diodes, and replace any defective components	The voltage does not return to the rated value.	- Exciter winding open circuit - Faulty exciter armature - Faulty AVR - Main field open circuit or short-circuited
(**) Warning : The AVR internal protection may cut in (overload lost connection, short circuit).			

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4.5.1 - Checking the winding

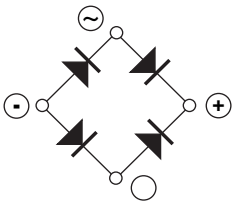
You can check the winding insulation by performing a high voltage test. In this case, you must disconnect all AVR wires.

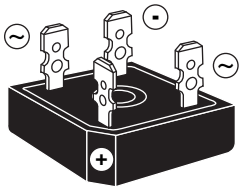
WARNING

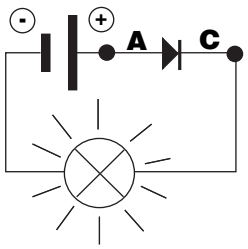
Damage caused to the AVR in such conditions is not covered by our warranty.

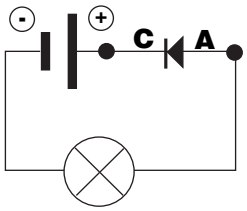
4.5.2 - Checking the diode bridge

A diode in good working order must allow the current to flow from the anode to the cathode.









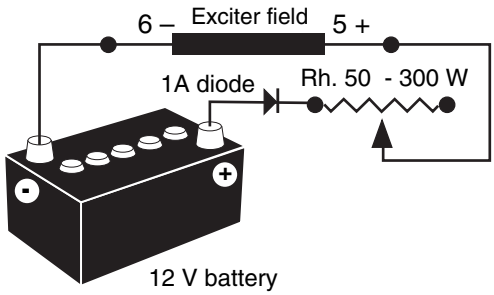
4.5.3 - Checking the windings and rotating diodes using separate excitation

During this procedure, make sure that the alternator is disconnected from any external load and inspect the terminal box to check that the connections are fully tightened.

1) Stop the unit, disconnect and isolate the AVR wires.
2) There are two ways of creating an assembly with separate excitation.

Assembly A : Connect a 12 V battery in series with a rheostat of approximately 50 ohms - 300 W and a diode on both field wires (5+) and (6-).

ASSEMBLY A



Assembly B : Connect a "Variac" variable power supply and a diode bridge on both exciter field wires (5+) and (6-).

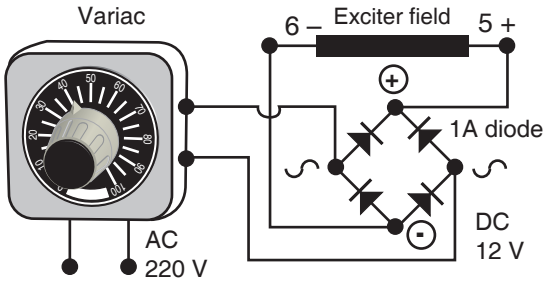
Both these systems should have characteristics which are compatible with the machine field excitation power (see the nameplate).

3) Run the unit at its rated speed.

4) Gradually increase the exciter field supply current by adjusting the rheostat or the Variac and measure the output voltages on L1 - L2 - L3, checking the no-load excitation voltages and currents (see machine nameplate or ask for the factory test report).

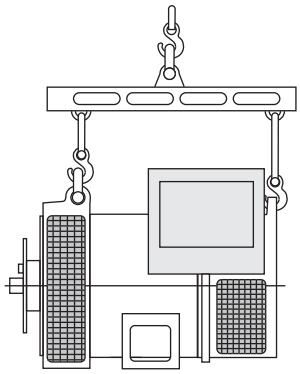
When the output voltage is at its rated value and balanced within 1 % for the rated excitation level, the machine is in good working order. The fault therefore comes from the AVR or its associated wiring (ie. sensing, auxiliary windings).

ASSEMBLY B



4.6 - Dismantling, reassembly (see sections 5.4.1. & 5.4.2)

During the warranty period, this operation should only be carried out in an LEROY-SOMER approved workshop or in our factory, otherwise the warranty may be invalidated. Whilst being handled, the machine should remain horizontal (rotor not locked when moved). Check how much the machine weighs (see section 4.8) before choosing the lifting method.
The choice of lifting hooks or handles should be determined by the shape of the lifting rings.



4.6.1 - Tools required

Pour le démontage total de la machine, il souhaitable de disposer des outils définis ci-dessous :
- 1 ratchet spanner + extension
- 1 torque wrench
- 1 7 mm flat spanner
- 1 8 mm flat spanner
- 1 10 mm flat spanner
- 1 12 mm flat spanner
- 1 8 mm socket
- 1 10 mm socket
- 1 13 mm socket
- 1 5 mm Allen key (eg. Facom: ET5)
- 1 6 mm Allen key (eg. Facom: ET6)
- 1 TORX T20 bit
- 1 TORX T30 bit
- 1 puller (eg. Facom: U35)
- 1 puller (eg. Facom: U32/350).

4.6.2 - Screw tightening torque

IDENTIFICATION	screw Ø	Torque N.m
Field term. block screw	M4	4 N.m
Field screw	M6	10 N.m
Diode bridge screw	M 6	5 N.m
Diode nut	M 5	4 N.m
Assembly rod	M 8	20 N.m
Earth screw	M 6	5 N.m
Balancing bolt	M 5	4 N.m
Discs/shaft screw	M 10	66 N.m
Lifting screw	M 8	4 N.m
Grille screw	M 6	5 N.m
Cover screw	M 6	5 N.m

4.6.3 - Access to connections and the regulation system

The terminals are accessed by removing the terminal box lid [48].

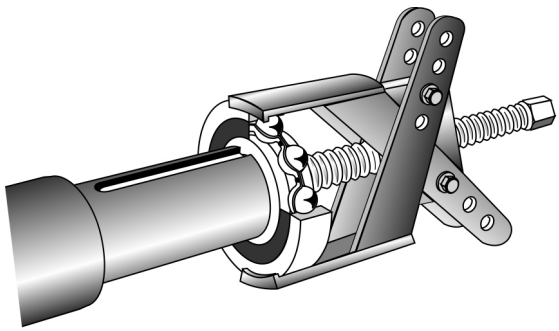
4.6.4 - Accessing, checking and replacing diodes

Two bearing alternator
- Unscrew 4 bolts (411)
- Remove the D.E. bearing housing and the rotor (4) taking care not to damage the windings
- Remove the rectifier bridge bolt
- Replace rectifier bridge (214)

Single bearing alternator
- Remove the rotor (4) taking care not to damage the windings
- Remove the rectifier bridge bolt
- Replace rectifier bridge (214)

4.6.5 - N.D.E. bearing replacing on single bearing alternator

- Remove rotor (4) taking care not to damage windings
- Extract bearing (70) with a bearing puller
- Position the new ball bearing after heating it, by induction system at 80° C



4.6.6 - Bearings replacing on two bearing alternator

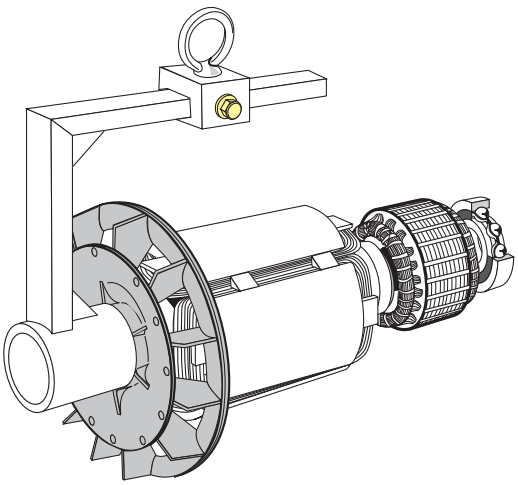
- Unscrew 4 bolts (411)
- Remove the D.E. bearing housing and the rotor (4) taking care not to damage the windings
- Remove circlips (284)
- Remove D.E. bearing (60)
- Remove N.D.E. bearing (70) with a bearing puller
- Position the new ball bearing after heating it, by induction system at 80° C

4.6.7 - Accessing the main field and stator

4.6.7.1 - Dismantling

Follow the procedure for dismantling bearings (see sections 4.6.5 and 4.6.6)

- Remove the coupling discs (single-bearing machine) or the DE flange (two-bearing machine) and insert a tube of the corresponding diameter on the shaft end or a support made according the following bellow.



- Rest the rotor on one of its poles, then slide it out. Use the tube as a lever arm to assist dismantling.
- After extraction, be careful with the fan. It is necessary to replace the fan in case of disassembling.

NOTE: If intervention is required on the main field (rewinding, replacement of components), the rotor assembly must be rebalanced.
Do not use the fan to turn the alternator rotor.

4.6.7.2 - End shield reassembling

- Mount the non drive end bracket (36) and drive end bracket (30) on the stator fasten by nuts (38) on studs (37)
- Connect the wiring
- Install the air inlet screen (51)
- Position terminal box cover

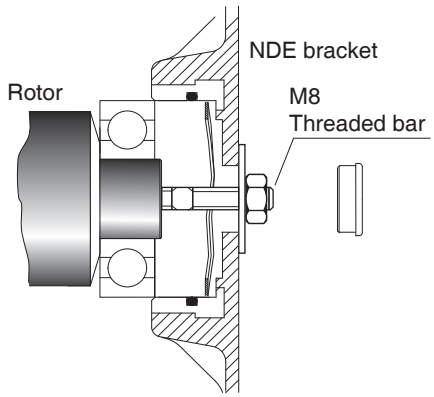
Rotor reassembling

Two bearing machine

- Install the D.E. bearing housing (410) on the rotor and replace the circlips (284)
- Remount outer bearing cap (61) fasten with bolts (62)
- Slide rotor (4) into the stator fasten by bolts (411)

Single bearing

- Slide rotor (4) into the stator and verify that the various



Note : If the rotor has been rewound, it must be rebalanced..

After final adjustments, the access panels or cover should be refitted.

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4.7 - Electrical characteristics table

Alternator - 2 and 4 pole - 50 Hz/60 Hz - Standard winding n°6 and M or M1 in dedicated single phase (400 V for the excitation values).
The voltage and current values are given for no-load operation and operation at rated load with separate field excitation. All values are given at ± 10% and may be changed without prior notification (for exact values, consult the test report). For 60 Hz machines, the "i exc" values are approximately 5 to 10 % lower.

4.7.1 - 3-phase : 2 pole with SHUNT excitation

Resistances at 20°C (Ω)

LSA 37	M7	M8	L6	VL11
Exciter field	16.4	16.4	16.4	16.4
Armature	0.455	0.455	0.455	0.455
Stator (Wdg 6)	0.87	0.577	0.322	0.234
Rotor	2.55	2.92	3.33	3.91

Field excitation current i exc (A) - 400 V - 50 Hz
"i exc": excitation current of the exciter field

LSA 37	M7	M8	L6	VL11
No load	0.59	0.53	0.64	0.57
On load	2.6	2.5	2.5	2.3

4.7.2 - Dedicated single-phase : 2 pole with SHUNT excitation

Resistances at 20 °C (Ω)

LSA 37	M7
L/N stator	16,4
Rotor	0,455
Field	0,2
Armature	2,92

Field excitation current i exc (A) - 120/240 V - 60 Hz
Symbols : "i exc" : excitation current of the exciter field

LSA 37	M7
No-load	0,6
At rated load	1,3

4.7.3 - 3-phase : 4 pole with SHUNT excitation

Resistances at 20°C (Ω)

LSA 37	M5	M6	M7	VL8
L/N stator	18	18	18	18
Rotor	0,56	0,56	0,56	0,56
Field	1,04	1,04	0,631	0,437
Armature	2,6	2,6	3,1	4,05

Field excitation current i exc (A) - 400 V - 50 Hz
Symbols : "i exc" : excitation current of the exciter field

LSA 37	M5	M6	M7	VL89
No-load	0,88	0,88	0,79	0,64
At rated load	2,6	2,6	2,5	2,25

4.7.4 - Dedicated single-phase : 4 pole with SHUNT excitation

Resistances at 20 °C (Ω)

LSA 37	VL8
L/N stator	18
Rotor	0,56
Field	0,218
Armature	4,05

Field excitation current i exc (A) - 120/240 V - 60 Hz
Symbols : "i exc" : excitation current of the exciter field

LSA 37	VL8
No-load	0,66
At rated load	1,45

4.8 - Weight tables

LSA 37 - 2P	Total weight (kg)	Rotor (kg)
M7	95	21
M8	110	24
L6	120	28
VL11	140	33

LSA 37 - 4P	Total weight (kg)	Rotor (kg)
M5	95	24
M6	95	24
M7	110	30
VL8	130	38

5 - SPARE PARTS

5.1 - First maintenance parts

Emergency repair kits are available as an option.
They contain the following items :

No.	Description	Qty	LSA 37	Coding
198	Voltage regulator (AVR)	1	R 250	AEM 110 RE 019
214	Diode bridge assembly	2	Fast recovery 35 A -800V	ESC 035 MD 005

5.2 - Description of bearings

No.	Description	Qty	LSA 37	Coding
60	D.E. bearing	1	6208 2Z/C3	RLT 040 BH 020
70	N.D.E. bearing	1	6207 2Z/C3	RLT 035 BH 020

5.3 - Technical support service

Our technical support service will be happy to provide any information you require.

When ordering spare parts, you should indicate the complete machine type, its serial number and the information indicated on the nameplate.

Address your enquiry to your usual contact or :

MOTEURS LEROY-SOMER
Usine de Sillac/Alternators
16015 ANGOULEME CEDEX - FRANCE
Tel. : (33) 05.45.64.45.64
Technical support service :
(33) 05.45.64.43.66 - (33) 05.45.64.43.67
(33) 05.45.64.43.68 - (33) 05.45.64.43.69
fax : (33) 05.45.64.43.24
e. mail : sat.sil@leroysomer.com

WARNING

Part numbers should be identified from the exploded views and their description in the parts list.
Our extensive network of "service stations" can dispatch the necessary parts without delay.
To ensure correct operation and the safety of our machines, we recommend the use of original manufacture spare parts.
In the event of failure to comply with this advice, the manufacturer cannot be held responsible for any damage.

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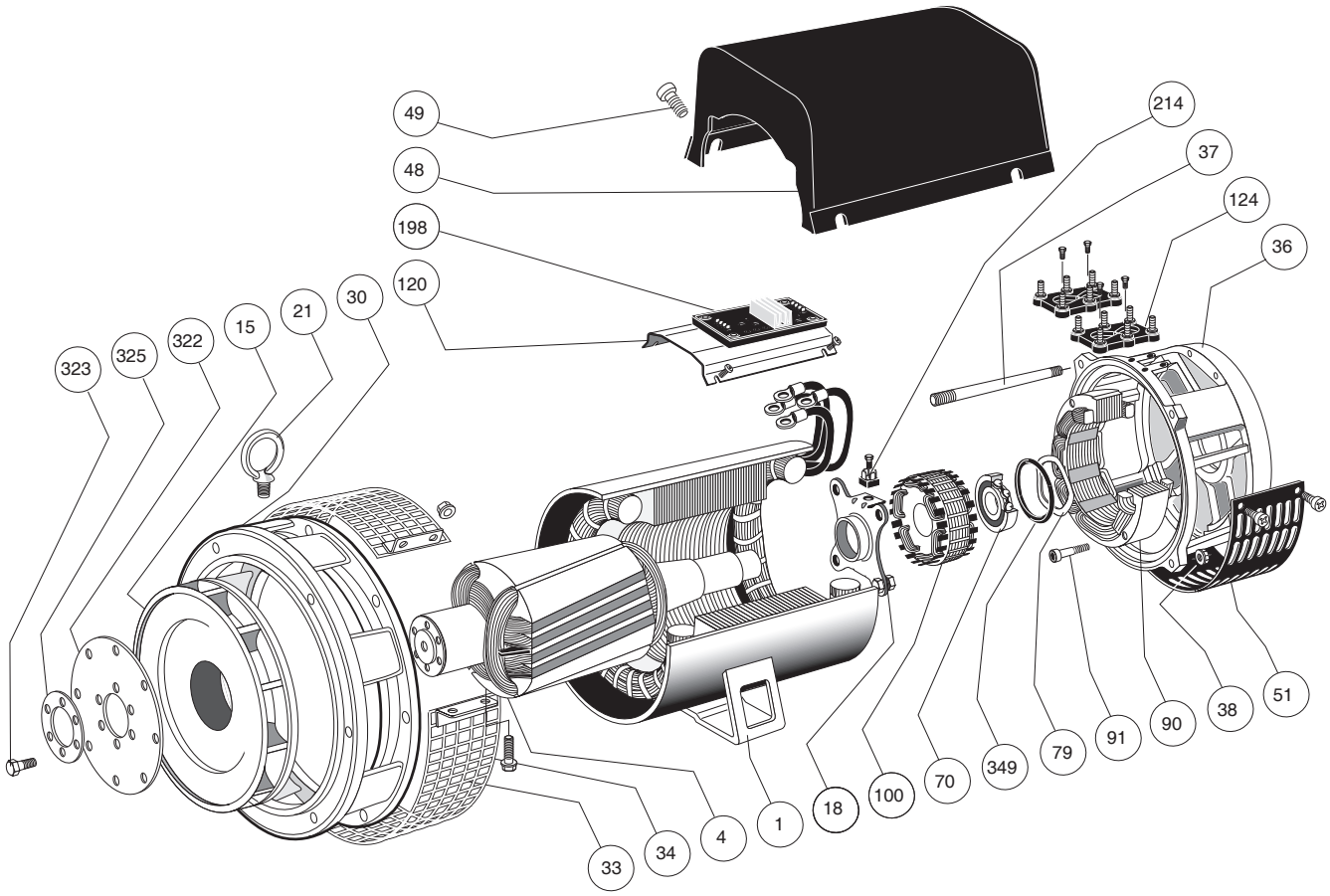
5.4 - Exploded view, parts list

5.4.1 - LSA 37 single bearing



No.	Nbr.	Description	No.	Nbr.	Description
1	1	Stator assembly	70	1	NDE bearing
4	1	Rotor assembly	79	1	Preloading wavy washer
15	1	Fan	90	1	Wound exciter field
18	1	Balancing discs	91	4	Field fixing screw
21	1 or 2	Lifting eye	100	1	Exciter armature
28	1	Earth terminal	120	1	Terminal plate support (AREP)
30	1	DE flange	124	2	Terminal plate
33	1 or 2	Air outlet grille	198	1	Regulator (AVR)
34	2	Bolts	214	1	Rectifier bridge
36	1	N.D.E. bracket	322	2	Coupling disc
37	4	Tie rod	323	5	Fixing screw
38	4	Screw	324	10	Clamping washer
48	1	Terminal box lid	349	1	O ring seal
49	-	Terminal box fixing screw			
51	1	Air intake grille			

LSA 37 SHUNT - 2 & 4 POLE
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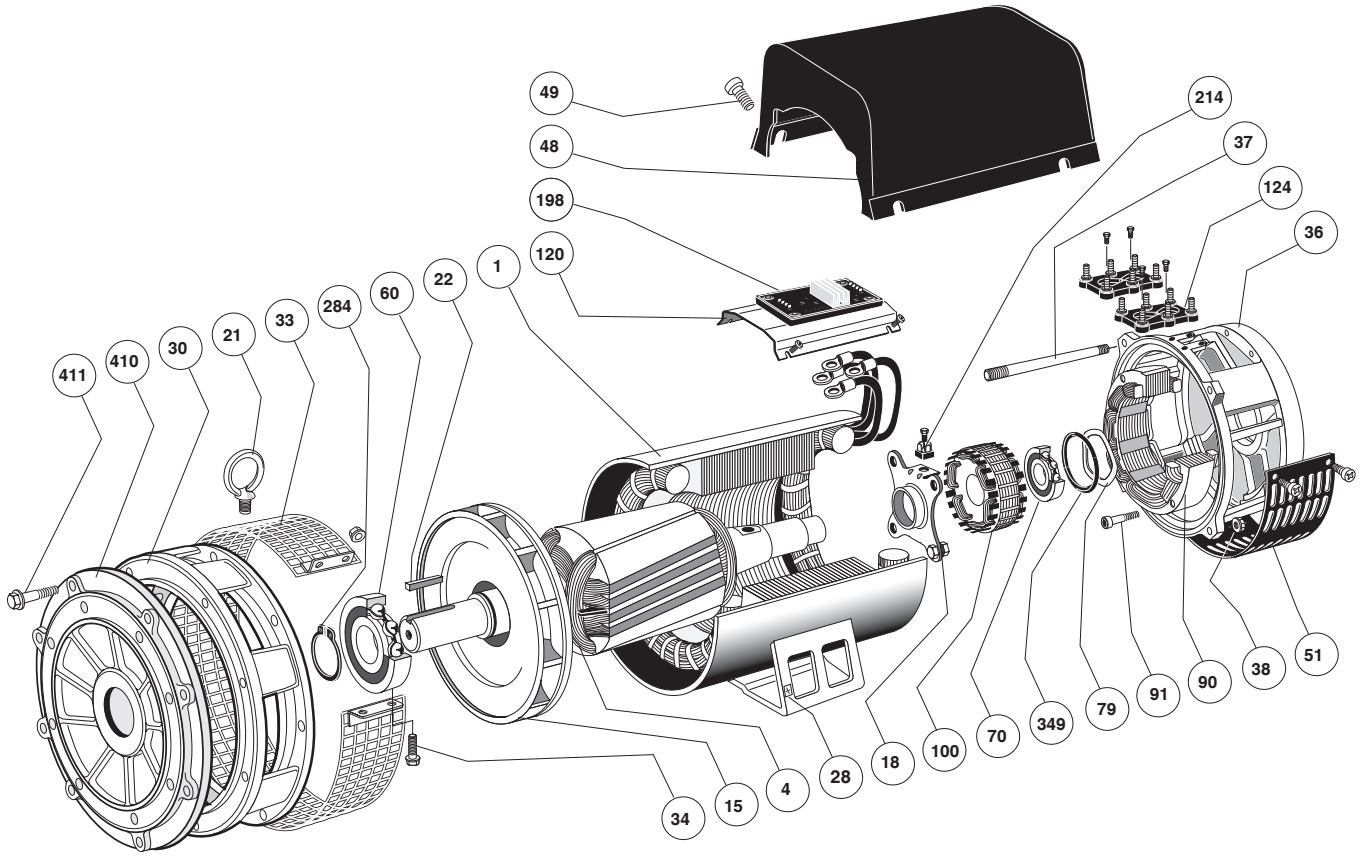
SPARE PARTS

5.4.2 - LSA 37 two-bearing



No.	Nbr.	Description	No.	Nbr.	Description
1	1	Stator assembly	60	1	DE bearing
4	1	Rotor assembly	70	1	NDE bearing
15	1	Fan	79	1	Preloading wavy washer
18	1	Balancing discs	90	1	Wound exciter field
21	1 or 2	Lifting eye	91	4	Field fixing screw
22	1	Key	100	1	Exciter armature
28	1	Earth terminal	120	1	Terminal plate support (AREP)
30	1	DE flange	124	2	Terminal plate
33	1 or 2	Air outlet grille	198	1	Regulator (AVR)
34	2	Bolts	214	1	Rectifiers bridge
36	1	N.D.E. bracket	284	1	Circlips
37	4	Tie rod	349	1	O ring seal
38	4	Screw	410	1	DE flange
48	1	Terminal box lid	411	4	Bolts
49	-	Terminal box fixing screw			
51	1	Air intake grille			

LEROY SOMER
Alternator Division

6 June 2007

EC DECLARATION OF INCORPORATION

Concerns electric generators designed to be incorporated in machines subject to Directive no. 98/37/EC.

The manufacturer : Moteurs LEROY-SOMER
Boulevard Marcellin Leroy
16015 ANGOULEME (France)

Herein declares that the electric generators in the PARTNER range (low voltage) and those series based on them conform to the following standards and directives:

- EN and IEC 60034-1 and 60034-5
- ISO 8528-3 (Design of alternators for generator applications)
- Low Voltage Directive no. 73/23/EC dated 19 February 1973, modified by Directive no. 93/68/EC dated 22 July 1993

These generators are designed to be used in complete power generating sets which must comply with the following standards and directives:

- Machinery directive no. 98/37/EC
- EMC directive no. 89/336/EC modified by Directives nos. 92/31 EC dated 28 April 1992 and 93/68/EC dated 22 July 1993, concerning the intrinsic characteristics of emission and immunity levels.
- Standard EN 60204-1 (Electrical Equipment of Industrial Machines)

WARNING:

The above-mentioned generators must not be commissioned until the machines in which they are to be incorporated have been declared as conforming to Directives nos. 98/37/EC and 89/336 EC and any other directives that may be applicable.

Ref : 4152 en – 06.2007/a

ALTERNATOR DIVISION

LEROY-SOMER 16015 ANGOULÊME CEDEX - FRANCE

RCS ANGOULÊME N° B 671 820 223
S.A. au capital de 62 779 000 ¤

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