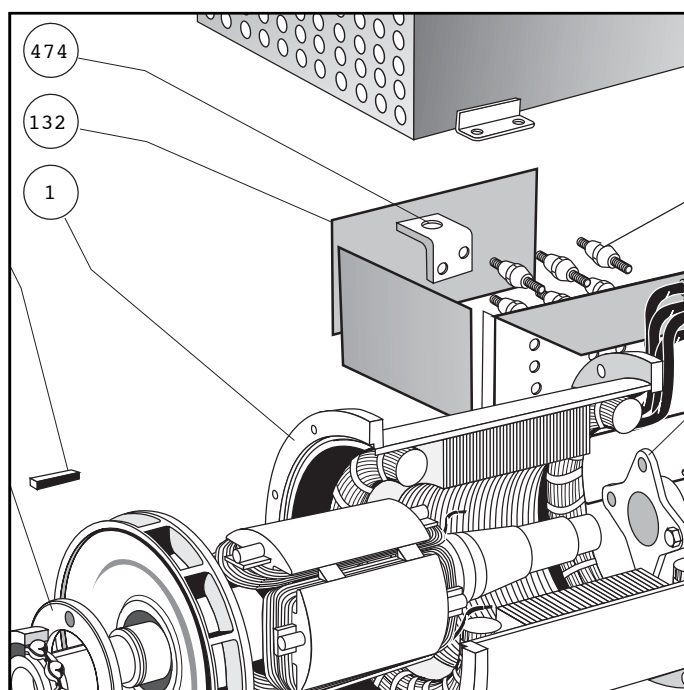


This manual is to be given to
the end user



LSA R 49.1

Air/air heat exchanger - AREP - 4 pole
ALTERNATORS - Ex II 3 G
Installation and maintenance

LSA R 49.1 Air/air heat exchanger

ALTERNATORS - Ex II 3 G

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.

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.

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.

WARNING SYMBOLS

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.

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.

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LSA R 49.1 Air/air heat exchanger

ALTERNATORS - Ex II 3 G

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LSA R 49.1 Air/air heat exchanger

ALTERNATORS - Ex II 3 G

RECEIPT

1 - RECEIPT

1.1 - Standards and safety measures

The alternators LSAR 49.1 are compatible with :

- the recommendations of the

International Electrotechnical Commission

IEC 34-1, (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).

- standard Atex EN 60079-0, EN 60079-7, EN 60079-18.

They are destined for use in explosive atmospheres (directive 94/9/CE).

The ATEX labelling on these alternators is : EX II 3G - EX em II T3 which implies that this material can only be used in zone 2.

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.

Before using your generator for the first time, read carefully the contents of this installation and maintenance manual, supplied with the machine. All operations performed on the generator should be undertaken by qualified personnel with specialist training in the commissioning, servicing and maintenance of electrical and mechanical machinery. This maintenance manual should be retained for the whole of the machine's life and be handed over with the contractual file.

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 different warning symbols used.

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 be 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 glued to 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 R 49.1 L6 C6/4 -**

- LSA : name used in the PARTNER range
- R : air/air heat exchanger
- 49.1 : machine type
- L6 : model
- C : Excitation system (C : AREP / J : SHUNT)
- 6/4 : 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.

Conforme à C.E.I 34-1(1994). According to I.E.C 34-1(1994). 

Type/Model	N° de série/Serial number		Date
Tension/Voltage	V Conn	V Conn	V Conn
Puissance continue	kVA Code	kVA Code	kVA Code
Continuous duty rating	kW A	kW A	kW A
Puissance secours	kVA	kVA	kVA
Stand by duty rating	kW A	kW A	kW A
Cos φ P.F.	Phase	Hz	Min ⁻¹ R.P.M.
Excitation service	V	excitation à vide	Classe thermique
Excitation continuous duty	V	excit. at no load	Thermal class
Roulement AV	Graisse	Régulateur	Ambiance
D.E. bearing	Graisse	A.V.R.	Ambient
Roulement AR	Altitude	Masse	h
N.D.E. bearing	Altitude	Masse	h

Température maximale d'utilisation : 50 C

LCIE Certificat n°

 **ALTERNATEURS** **PARTNER**

NE PAS OUVRIR SOUS TENSION

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 (heatshrink 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.

LSA R 49.1 Air/air heat exchanger

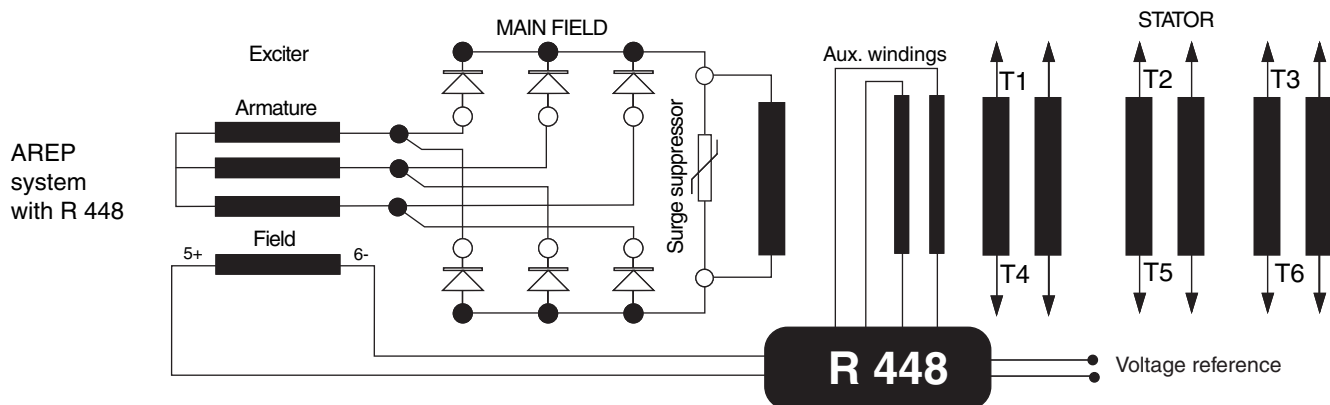
ALTERNATORS - Ex II 3 G

TECHNICAL CHARACTERISTICS

2 - TECHNICAL CHARACTERISTICS

2.1 - Electrical characteristics

PARTNER LSA R alternator is a machine without sliprings or revolving field brushes, wound as «2/3 pitch» ; 6-wire, with class H insulation and a field excitation system available in either AREP (see diagram).



Interference suppression conforms to standard EN 55011, group 1, class B.

2.2 - Mechanical characteristics

- Steel frame
- End shields in steel, pipe in cast iron
- Greasable ball bearings
- Mounting arrangement
- IM 1001 (B 34) : two-bearing with SAE flange and standard cylindrical shaft extension
- Degree of protection : IP 55

2.3 - Options

- Stator temperature sensors.
- PTC or PT100 (1 or 2 per phase).
- Strip heater with constant power.



Warning : the supply is still present when the machine has stopped.

- Bearing detection probe.
- PTC or PT100 (1 or 2 per phase).

For example :coupling reheating resistors and PT100 2/phase probes (see diagram page 9).

2.4 - Excitation system

The AREP excitation system is driven by the R448 regulator, or any other compatible model, mounted on the outside of the machine (see corresponding regulator instructions and the electrical diagrams provided with the machine).

LSA R 49.1 Air/air heat exchanger

ALTERNATORS - Ex II 3 G

INSTALLATION

3 - INSTALLATION

3.1 - Assembly



All mechanical handling operations must be undertaken using approved equipment.

Whilst being handled, the machine should remain horizontal.

3.1.1 - Handling

The generously-sized lifting rings are for handling the alternator alone. They must not be used to lift the genset. Choose a lifting system which respects the positioning of the rings.

3.1.2 - Coupling

Two-bearing alternator

- Semi-flexible coupling

Careful alignment of the machines is recommended, checking that the concentricity and parallelism of both parts of the coupling do not exceed 0.1 mm.

WARNING

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

3.1.3 - Location

The machine must only be used in the environmental conditions which are defined when ordering.



Warning : the ambient temperature cannot exceed 50°C.

. Fresh air, free from damp and dust, must be able to circulate freely around the air intake grilles on the opposite side from the coupling. It is essential to prevent not only the recycling of hot air from the machine or engine, but also exhaust fumes.

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 insulation is less than 1 megohm for the stator and 100,000 ohms for the other windings.

There are three possible methods for restoring these minimum values.

a) Dry out the machine for 24 hours in a drying oven at a temperature of approximately 110°C (without the AVR).

b) Blow hot air into the air intake, having made sure that the machine is rotating with the exciter field disconnected.

c) Run in short-circuit mode (disconnect the AVR) .

- With the machine stopped, short-circuit the three output power terminals 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 12 Volt battery to the exciter field terminals, respecting the polarity, in series with a rheostat for adjusting the resistance in order to obtain an excitation current equal to the rated stator current (eg : 10Ω/50W),

- Open fully all the alternator openings.

- Run the alternator at its rated speed, and 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.

3.2.2 - Mechanical checks

Before starting the machine for the first time, check that :

- all fixing bolts and screws are tight,

- cooling air is drawn in freely,

- the protective grilles 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.

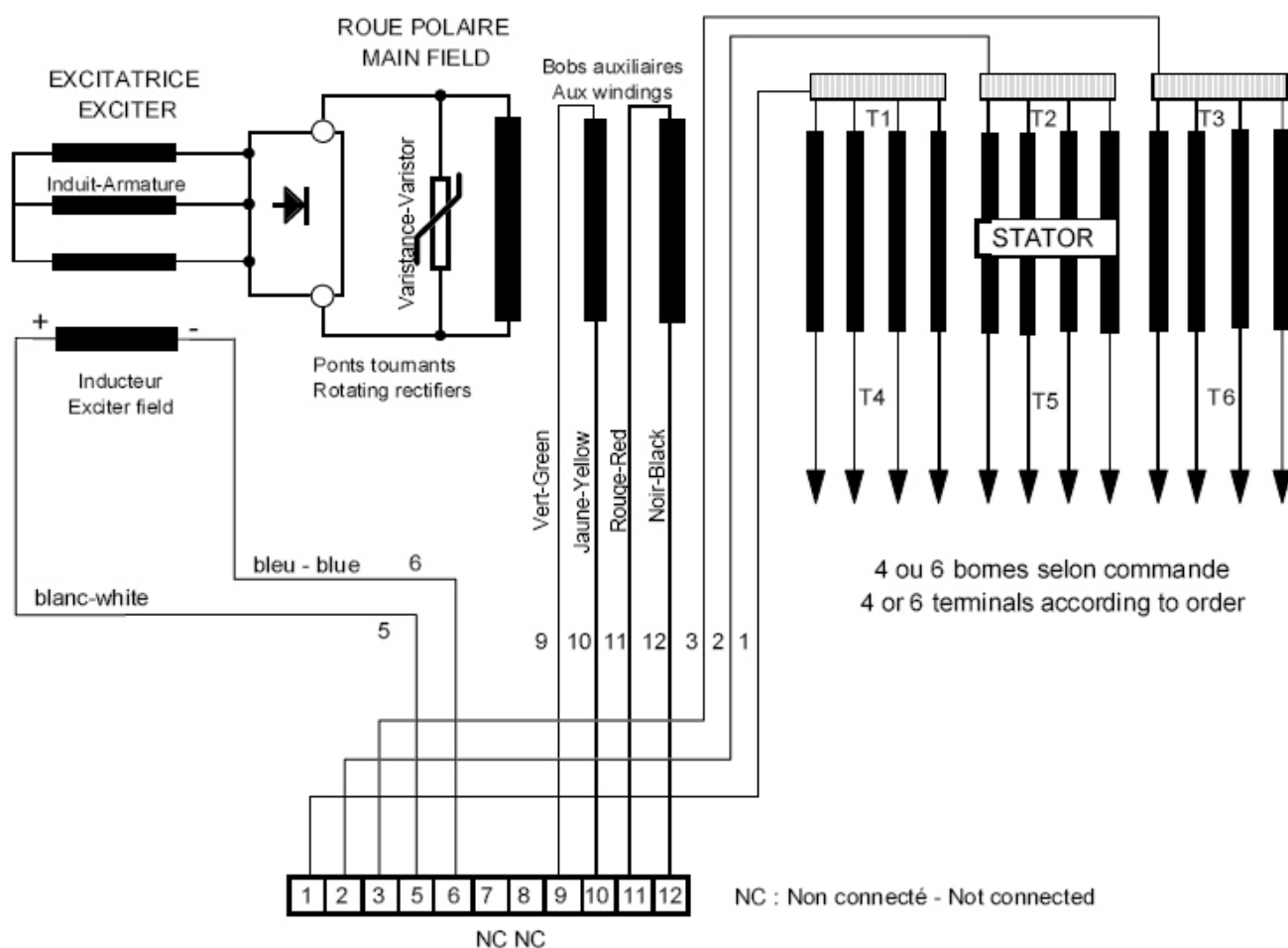
- the winding connection corresponds to the site operating voltage (see section 3.3).

LSA R 49.1 Air/air heat exchanger

ALTERNATORS - Ex II 3 G

INSTALLATION

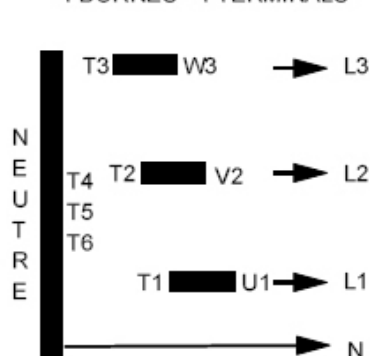
3.3 - Terminal connection diagrams



COUPLAGE DES BORNES - TERMINALS CONNEXION

STANDARD

4 BORNES - 4 TERMINALS

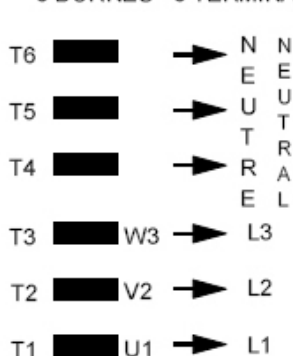


AV - DE

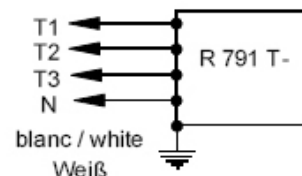
AR - NDE

OPTION - OPTIONAL

6 BORNES - 6 TERMINALS



OPTION - R 791 - OPTIONAL



---> T1 - T2 - T3 : noir / black / schwarz
---> N : bleu / blue / blau

Schéma des connexions internes - Connection diagram

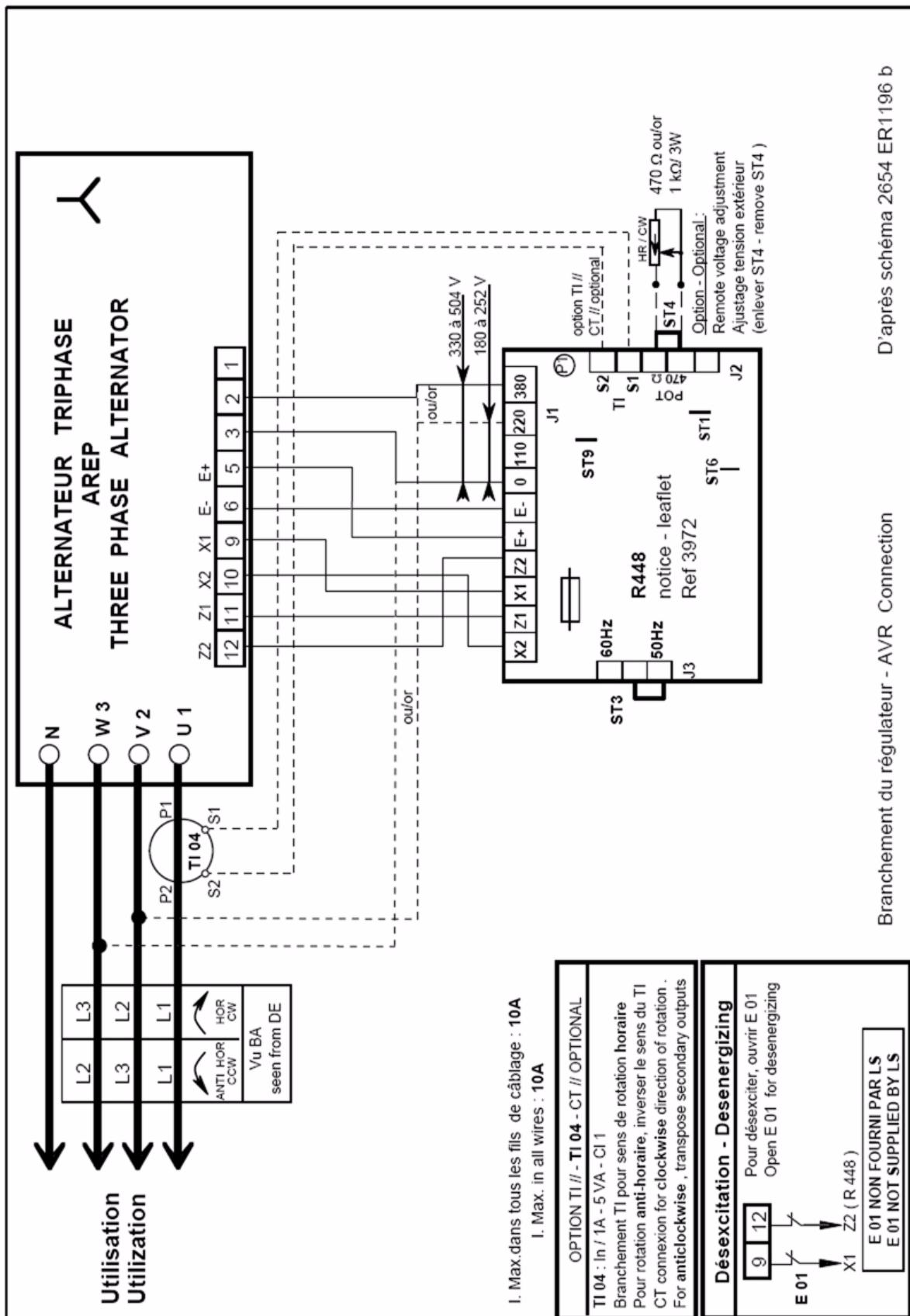
D'après schéma 2560 .10.96 c

LSA R 49.1 Air/air heat exchanger

ALTERNATORS - Ex II 3 G

INSTALLATION

3.3.1 - A.V.R. connection



LSA R 49.1 Air/air heat exchanger

ALTERNATORS - Ex II 3 G

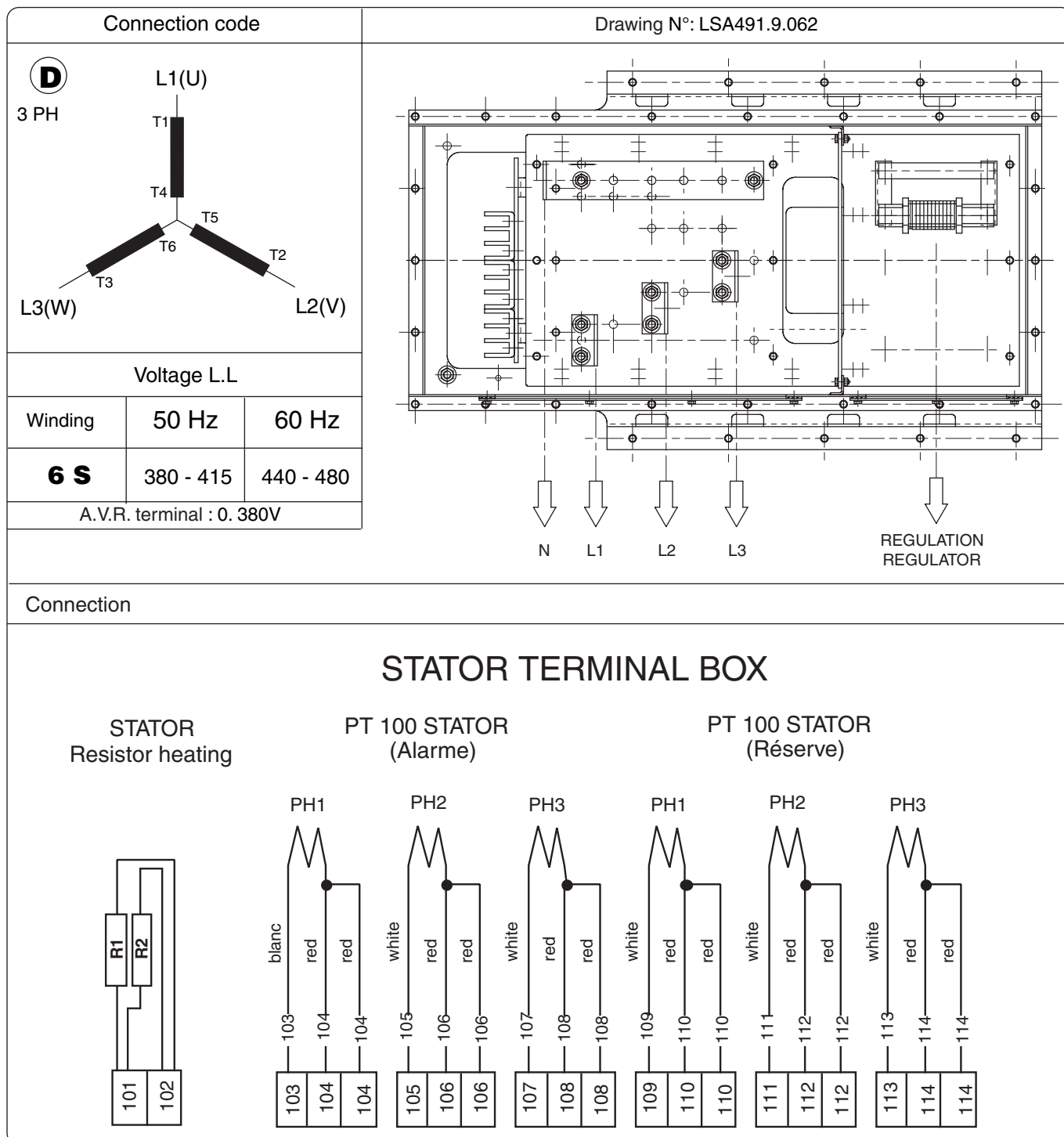
INSTALLATION

3.4 - Internal coupling

3.4.1 - Standard terminal connection : 6-wire



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



LSA R 49.1 Air/air heat exchanger

ALTERNATORS - Ex II 3 G

INSTALLATION

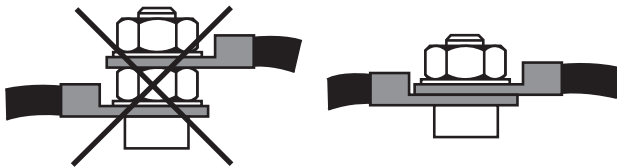
3.4.2 - Connection checks



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

Check that :

- The residual 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. (In this case, disconnect the wire of the interference suppression module linking the neutral).
- Any protective devices in place have not been tripped.
- If there is an external AVR, 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 busbar separating the terminals as shown in the terminal connection diagram.



3.5 - Commissioning



The machine can only be started up and used if the installation is in accordance with the regulations and instructions 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 achieve 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).

3.6 - Settings



The various adjustments during tests must be made by a qualified engineer.

WARNING

Take care that the drive speed specified on the nameplate is reached before commencing adjustment

1500 min⁻¹ / 50Hz or 1800 min⁻¹ / 60 Hz.

Do not try to set the voltage if the frequency or speed is not correct (risk of irreparable rotor damage).

The only possible adjustments to the machine should be made on the AVR.



After operational testing, replace all access panels or covers.

LSA R 49.1 Air/air heat exchanger

ALTERNATORS - Ex II 3 G

SERVICING - MAINTENANCE

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.

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 - Exchanger

4.2.2.1 - Primary Circuit (hot air)

The air to be cooled flows through the machine and through the exchanger in a closed system. The air circulation is generally ensured by a ventilator locked onto the machine axle and situated on the front bearing side. In particular cases (variable speed ...) the air circulation is ensured by a moto-ventilator mounted on the exchanger casing.

4.2.2.2 - Secondary Circuit (cold air)

Ambiant air is usually used for cooling. The circulation through tubes is ensured ; either by a turbine mounted overhanging the back of the machine on a bearing extension or by a moto-ventilation mounted on the exchanger. In order to prevent excessive overheating caused by the tubes clogging up, it is advisable that the stator coil be monitored with thermal detection probes (PTC or PT100).

4.2.2.3 - Performances

We guarantee that the performance of the exchanger complies with the definitions agreed upon. (ambient temperature, power to be evacuated, environmental conditions, loss of charge etc.).

4.2.3 - Manufacture of the exchanger

The exchanger casing is made from steel sheets. The network of tubes is generally composed of aluminium alloy or steel tubes. The ends of the tubes are fitted to steel panels.

4.2.4 - Exchanger maintenance

If the coolant is used in a clean atmosphere it can run for several years with no maintenance. If the atmosphere is polluted (dust, sand, greasy vapours etc.) the tubes must be cleaned regularly. Clogging of the tubes becomes noticeable when the thermal exchange performances are reduced and the air in the primary circuit overheats causing the machine to also overheat ; therefore, machine overheating indicates that the exchanger is probably dirty.

4.2.5 - Bearings

The bearings are greasable. It is advisable to lubricate the machine during operation. The lubrication characteristics are given in the table below.

Bearings	6322/C3	6320/C3
Quantity of grease : gr or cm ³	50	60
Lubrication interval : hours	4500	4500

Lubrication intervals are given for grease type :

LITHIUM - standard - NLGI 3.

The factory lubrication is performed with grease :

ESSO UNIREX N3.

Before using another grease, check for compatibility with the original one. Monitor the temperature rise in the bearings, which should not exceed 60°C above the ambient temperature. Should this value be exceeded, the machine must be stopped and checks carried out.

4.2.6 - Electrical servicing

Cleaning product for the windings

WARNING

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

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

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

LSA R 49.1 Air/air heat exchanger

ALTERNATORS - Ex II 3 G

SERVICING - MAINTENANCE

Cleaning of the stator, rotor, exciter and diode bridge

The insulating components and the impregnation system are not at risk of damage from solvents (see the above 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.

4.2.7 - 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.

The machine should be cleaned with a degreasing agent, applied using a brush. Check that the degreasing agent will not affect the paint.

Compressed air should be used to remove any dust.

After cleaning the alternator, it is essential to check the winding insulation (see sections § 3.2. and § 4.8.).

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 nameplate).

Repeat the operations defined in section 3.

LSA R 49.1 Air/air heat exchanger

ALTERNATORS - Ex II 3 G

SERVICING - MAINTENANCE

4.4 - Mechanical defects

	Fault	Possible causes
Bearing	Excessive overheating of one or both bearings (temperature > 80°C on the bearing retainers with or without abnormal noise)	<ul style="list-style-type: none"> - End shields incorrectly aligned (flanges not properly fitted). - If the bearing has turned blue or if the grease has turned black, change the bearing.
Abnormal temperature	Excessive overheating of alternator housing (more than 40 °C above the ambient temperature)	<ul style="list-style-type: none"> - Air flow (intake-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
Vibration	Excessive vibration	<ul style="list-style-type: none"> - Misalignment (coupling) - Defective mounting or play in coupling - Rotor balancing fault
	Excessive vibration and humming noise coming from the machine	<ul style="list-style-type: none"> - Alternator operating in single-phase mode (single-phase load or faulty contactor or installation fault) - Stator short-circuit
Abnormal noise	Alternator damaged by a significant impact, followed by humming and vibration	<ul style="list-style-type: none"> - System short-circuit - Mis-paralleling - Possible consequences - Broken or damaged coupling - Broken or bent shaft end. - Shifting and short-circuit of main field winding - Fan fractured or coming loose on shaft - Irreparable damage to rotating diodes or 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 diodes - Armature short-circuit
		The alternator builds up but its voltage disappears when the battery is removed	- Faulty AVR - Field windings disconnected - Main field winding open circuit - check the resistance
Voltage too low	Check the drive speed	Correct speed	Check the AVR connections (AVR may be faulty) - 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 - 1 faulty diode
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+ and E- on the AVR	Voltage between E+ and E- AREP < 10V	- Check the speed (or LAM set too high)
		Voltage between E+ and E- AREP > 15V	- Faulty rotating diodes - Short-circuit in the main field. Check the resistance - Faulty exciter armature.
(**) Caution : For single-phase operation, check that the sensing wires coming from the AVR are correctly connected to the operating 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
(***) Caution : Internal protection may be activated (overload, open circuit, short-circuit)			

LSA R 49.1 Air/air heat exchanger

ALTERNATORS - Ex II 3 G

SERVICING - MAINTENANCE

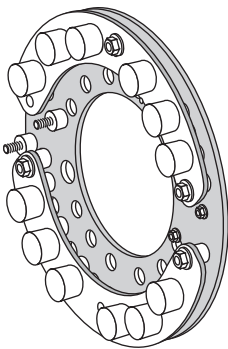
4.5.1 - Checking the winding

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



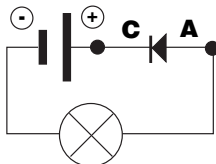
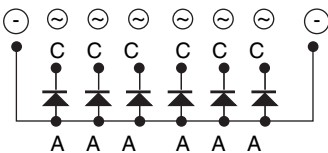
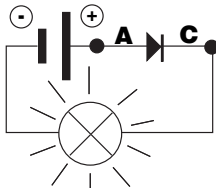
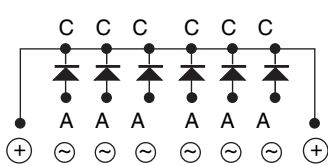
DIODE BRIDGE

Anode

Cathode



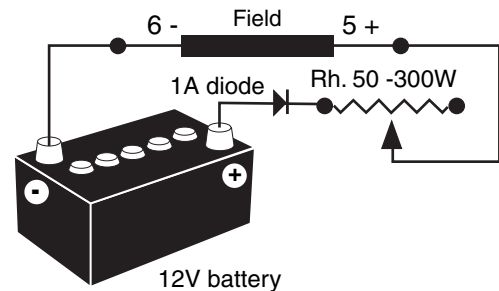
A diode in good working order must allow the current to flow from the anode to the cathode.



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

WARNING : Adapt the diode to the rated excitation current of the alternator (see nameplate).

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 current by adjusting the rheostat or the variac and measure the output voltages on L1 - L2 - L3, checking the excitation voltage and current at no load and on load (see the 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).

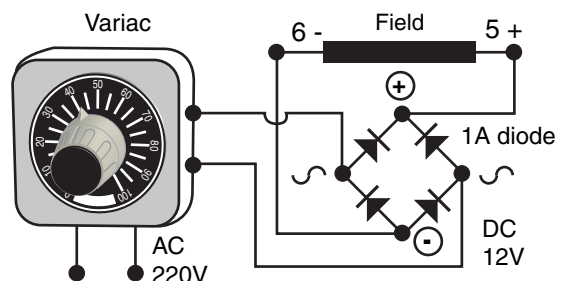
4.5.3 - Checking the windings and rotating diodes using separate excitation



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 B



LSA R 49.1 Air/air heat exchanger

ALTERNATORS - Ex II 3 G

SERVICING - MAINTENANCE

4.6 - Dismantling, reassembly

During the warranty period, this operation should only be carried out in an approved workshop or in our factory, otherwise the warranty may be invalidated.

Whilst being handled, the machine should remain horizontal.

4.6.1 - Tools required

To fully dismantle the machine, we recommend using the tools listed below :

- 1 ratchet spanner + extension
- 1 torque wrench
- 1 set of flat spanners : 9 mm, 10 mm, 18 mm
- 1 socket set : 10, 13, 17, 18, 19, 24 mm,
- 1 puller (U35) / (U32/350)
- 1 hexagonal wrench 6 mm - 10 mm.

4.6.2 - Screw tightening torque

IDENTIFICATION	screw Ø	Torque N.m
Exciter screw	M6	8,3
Diode / Star bridge	M 6	10
Diode nut	M 6	3
DE shield / frame screw	M 12	70
NDE shield / frame screw	M 12	70
Bush / casing	M 12	70
Earth screw	M 12	35
Grille screws	M 6	4
Cover screws	M 6	5
Stator connection nut	M 12	35

4.6.3 - Dismantling - Reassembly

4.6.3.1 - Access to diodes

- Remove the diode access door (140).
- Disconnect the diodes.
- Check 12 diodes using an ohmmeter or a battery lamp (see section 5 - 4).

If the diodes are faulty :

- Remove the surge suppressor (347).
- Remove the 6 "H" mounting nuts for the diode assembly on the support.
- Change the fitted caps, respecting the polarity.

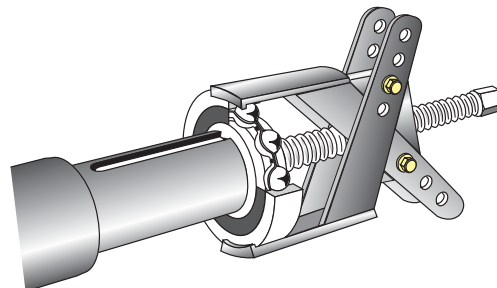
4.6.4 - Access to connections and the regulation system

Access is easy after the hood has been removed (132).

4.6.5 - Replacing the NDE bearing

- Remove the terminal block cover (132).
- Unplug (+ et -) field system.
- If bearing probe, unplug at the terminal, break the network circlips up to the bearing.
- Dismantle the air intake grid (50).
- Dismantle the air turbine (118).
- Dismantle the air turbine cover (117).
- Remove the V-Ring gasket (249).
- Remove the inner hood bearing screws (78).
- Remove the rear flange (82).

- Remove the ball bearing (70) using a puller with a central screw (see fig. below).



- Change the "O" ring (349).
- Fit the new bearing, after heating it by induction at approximately 80°C.

WARNING

REPLACE THE DISMANTLED BEARING WITH A NEW ONE.

4.6.6 - Replacing the DE bearing

- If bearing probe, unplug at the terminal, break the network clips up to the bearing.
- Remove the V-Ring gasket (247).
- Remove the inner hood bearing screws (68).
- Remove the rear flange (410).
- Take out the circlips (284).
- Remove the ball bearing (60) using a puller with a central screw.
- Fit the new bearing, after heating it by induction at approximately 80°C.

WARNING

REPLACE THE DISMANTLED BEARING WITH A NEW ONE.

4.6.7 - Complete dismantling

- Take out the NDE bearing following the instructions in section 4.6.5.
- Take out the DE bearing following the instructions in section 4.6.6.
- Remove the access plates (140).
- Remove the lubricating tubes (77).
- Dismantle the mill tube case (116).
- Dismantle the front bush (30).
- Support the rotor (4) on the interconnection side using a belt or a bracket.
- Using a mallet gently hit the end of the shaft on the opposite side of the interconnection.
- As the rotor moves adjust the belt to compensate for shift in weight.

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4.6.8 - Complete reassembly

- Place the "O" ring seal (349) and the preloading wavy washer (79) in the bearing seat (36).
- Mount and fix the rear flange (82) on the rear base (36).
- Mount the rotor (4) in the stator (1).
- Mount and fix the front bush (30).
- Remount the tube casings (116).
- Remount the front and rear tubes (77) in the inner bearing caps.
- Remount the access plates (140).
- Remount and fix the front flange (410).
- Fix the inner cap (68).
- Remount the V-Ring gasket (247).
- Remount the V-Ring gasket (249).
- Remount the turbine cover (117).
- Remount the turbine (118).
- Remount the air intake grid (51).
- Reconnect the field system and close the terminal box.

4.7 - Table of characteristics

Table of average values.

Alternator - 4 poles - 50 Hz - Standard winding No. 6.
(400V 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 $\pm 10\%$ and may be changed without prior notification (for exact values, consult the test report).

4.7.1 - Resistances of main windings at 20°C (Ω)

Average values for 6S winding - (6 wires)

LSA 49.1	STATOR L/N	ROTOR	Field	Armature
L6	0.0029	0.38	12	0.08
L9	0.0021	0.43	12	0.08

4.7.2 - Field excitation current i_{exc} (A)

LSA 49.1	No load	At rated load
L6	0.5	2.2
L9	0.9	2.2

4.7.3 - Voltage of auxiliary windings at no load

LSA 49.1	X1, X2	Z1, Z2
50 Hz	70 V	10 V
60 Hz	85 V	12 V

For 60 Hz machines, the " i_{exc} " values are approximately 5 to 10% lower.

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SPARE PARTS

5 - SPARE PARTS

5.1 - First maintenance parts

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

Ref.	Description	Reference	Code
198	Voltage regulator (AVR)r	R 448	AEM 110 RE 005
343	Forward diodes	LSA 491.9.056	SEN 491 AW 056
	Backward diodes	LSA 491.9.057	SEN 491 AW 057
347	Surge suppressor : 250V	LSA 491.9.058	SEN 491 AW 058
	AVR slow-blow fuse	250V - 10A	PEL 010 FA 004
	Other spare parts		
60	DE bearing	6322 - C3	RLT 110 OU 030
70	NDE bearing	6320 - C3	RLT 100 OU 030

Part numbers should be identified from the exploded views and their description from the parts list.

Our extensive network of service centres can dispatch the necessary parts without delay.

To ensure correct operation and the safety of our machines, we recommend the use of original manufacturer spare parts. In the event of failure to comply with this advice, the manufacturer cannot be held responsible for any damage.

5.2 - Technical support service

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

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

Address your enquiry to your usual contact, or to :

MOTEURS LEROY-SOMER

Usine de Sillac/Alternateurs

16015 ANGOULEME CEDEX - FRANCE

Tel. : (33) 05.45.64.45.64

Technical Support Service : (33) 05.45.64.43.69

(33) 05.45.64.43.67

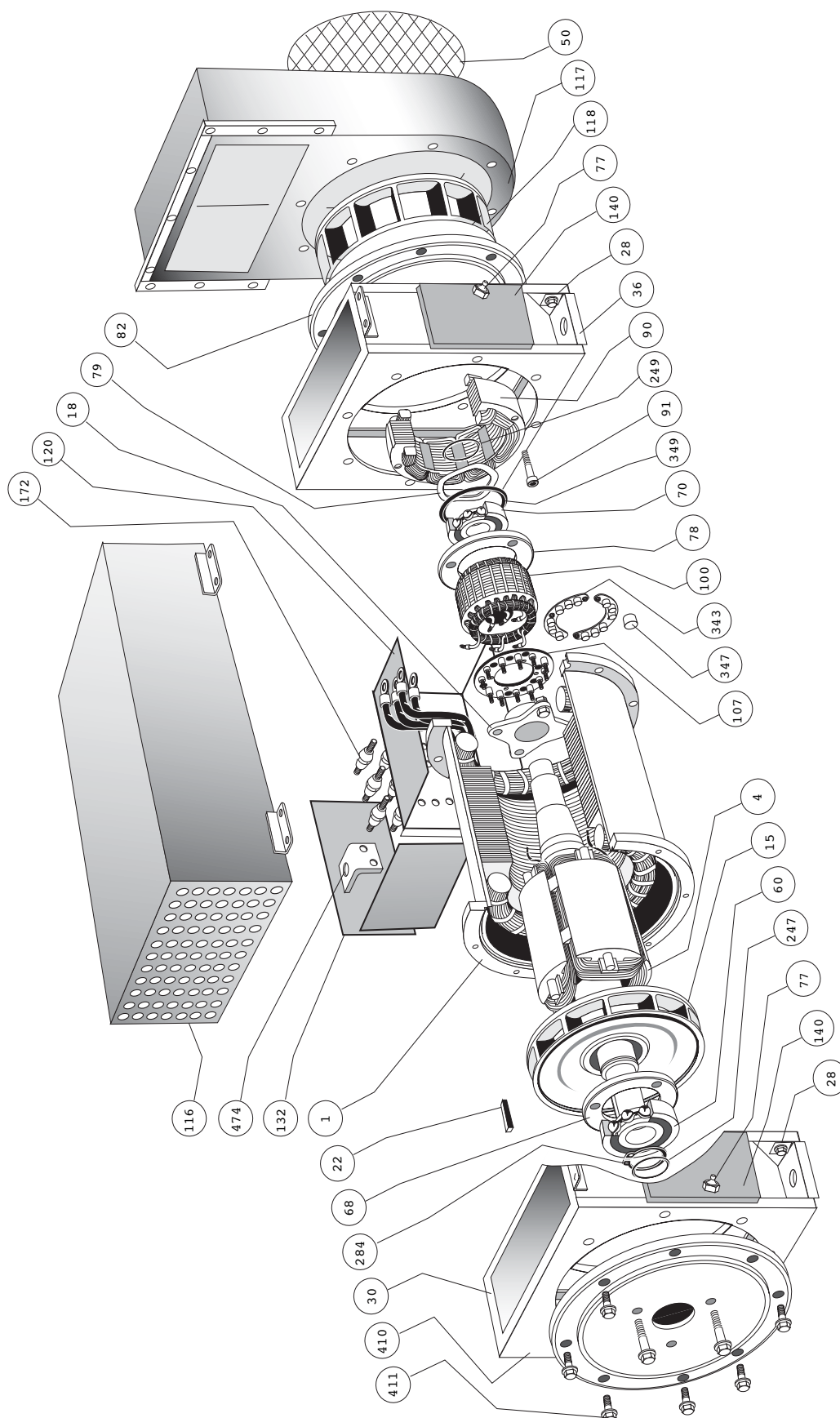
Fax : (33) 05.45.64.43.24

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SPARE PARTS

5.3 - Exploded view



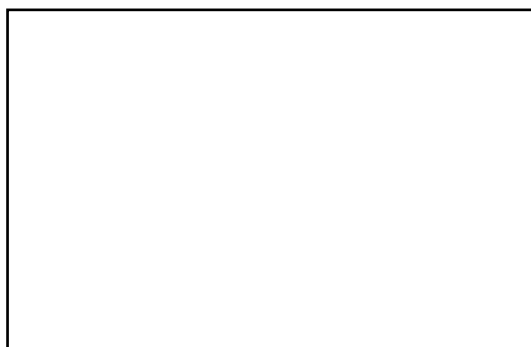
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ALTERNATORS - Ex II 3 G

SPARE PARTS

5.4 - Parts list

Ref.	Qty	Description	Ref.	Qty	Description
1	1	Stator assembly	247	1	DE "O" ring
4	1	Rotor assembly	249	1	NDE "O" ring
15	1	Primary circuit turbine	284	1	Circlips
18	1	Balancing disc	343	1	Complete diode assembly
22	1	End shaft key	347	1	Protection varistor (+ C.T.)
28	4	Earth terminal	349	1	"O" ring
30	1	Bush interconnection side	410	1	Front flange
36	1	Bush exciter side	411	8	Fixing screws for front flange
50	1	Air intake grille	474	-	Departure band
60	1	DE bearing			
68	1	Front inner cap			
70	1	NDE bearing			
77	2	Lubricating tube			
78	1	Rear inner cap			
79	1	Preloading wavy washer			
82	1	Rear flange bearing			
90	1	Exciter field			
91	4	Field fixing screws			
100	1	Exciter armature			
107	1	Diode assembly support			
116	1	Air tube casing			
117	1	Air ventilation casing			
118	1	Secondary circuit turbine			
120	1	Terminal support			
132	1	Terminal box			
140	2	Diode access door			
172	-	Isolator			



MOTEURS LEROY-SOMER 16015 ANGOULÊME CEDEX - FRANCE

338 567 258 RCS ANGOULÊME
S.A. au capital de 62 779 000 €

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