

## LSA R/H 49.1 Air/Air or Air/Water heat exchanger

**Low Voltage Alternator - 4 pole**  
Installation and maintenance

**LEROY-SOMER™**

***Nidec***  
All for dreams

# LSA R/H 49.1

## Low Voltage Alternator - 4 pole

**This manual concerns the alternator which you have just purchased.  
We wish to draw your attention to the contents of this maintenance manual.**

### 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.**

### SAFETY INSTRUCTIONS

We wish to draw your attention to the following 2 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.

### WARNING

**The alternators must not be put into service until the machines in which they are to be incorporated have been declared compliant with EC Directives plus any other directives that may be applicable.**

**This manual is to be given to the end user.**

**The range of electric alternators and their derivatives, manufactured by us or on our behalf, comply with the technical requirements of the customs Union directives (EAC).**

© - We reserve the right to modify the characteristics of this product 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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### Disposal and recycling instructions

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### 1 - RECEIPT

#### 1.1 - Standards and safety measures

Our alternators comply with most international standards.

See the EC Declaration of Incorporation on the last page.

#### 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 fixed on the machine (see drawing).

Make sure that the nameplate on the machine conforms to your order.

So that you can identify your alternator 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 (< 90%); after a long period of storage, check the machine insulation. To prevent the bearings from becoming marked, do not store in an environment with significant vibration.

#### 1.5 - Application

This alternator is mainly designed to produce electricity in the context of applications involving the use of generators.

#### 1.6 - Usage restrictions

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

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 Continuous duty rating	kVA Code	kVA Code	kVA Code
Puissance secours Stand by duty rating	kVA	kVA	kVA
Cos φ P.F.	Phase	Hz	Min <sup>-1</sup> R.P.M.
Excitation continue Excitation continuous duty	V	excitation à vide excit. at no load	Classe thermique Thermal class
Roulement AV D.E. bearing	Graisse Grease	Altitude	Masse Weight
Roulement AR N.D.E. bearing	IP	Altitude	Masse

Température maximale d'utilisation : 50 C

LCIE Certificat n°

 **LEROY SOMER** ALTERNATEURS ALTERNATORS

**PARTNER**

NE PAS OUVRIR SOUS TENSION

1 024 962/6

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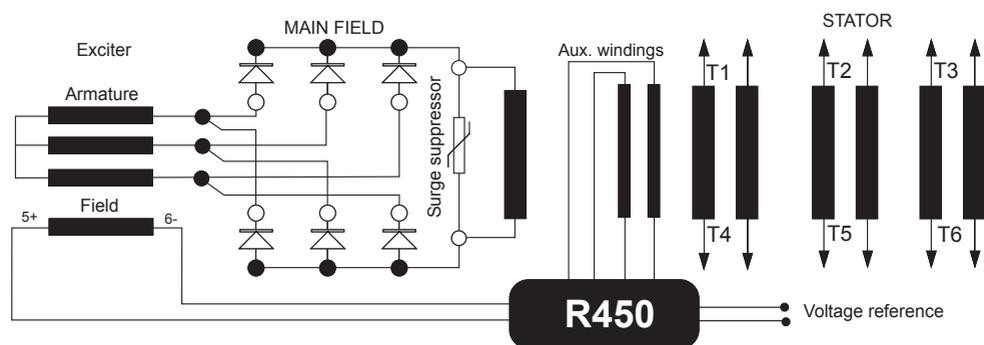
## Low Voltage Alternator - 4 pole

## 2 - TECHNICAL CHARACTERISTICS

### 2.1 - Electrical characteristics

This 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). In order to conform to standard EN 61000-6.3, EN 61000-6.2, EN 55011, the R791 interference suppression kit is needed.

### AREP system with R450



### 2.2 - Mechanical characteristic

- Steel frame
- End shields in steel, pipe in cast iron
- Greasable ball bearings
- Mounting arrangement: 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)
- Reheating resistors



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

- Bearing detection probe

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 R450 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).

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### 3 - INSTALLATION

#### 3.1 - Assembly



All mechanical handling operations must be undertaken using approved equipment.

Whilst being handled, the machine should remain horizontal.

##### • 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.

##### • Double-bearing coupling

- Semi-flexible coupling

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

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

##### • Location

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



LSA R only:

**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 - Checks prior to first use

##### • 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 2 possible methods for restoring the above minimum values.

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

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

##### **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.

### WARNING

**Ensure that the alternator has the degree of protection matching the defined environmental conditions.**

##### • Mechanical checks

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

- all fixing screws are tight,
- the length of screw and the tightening torque are correct,
- the 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).

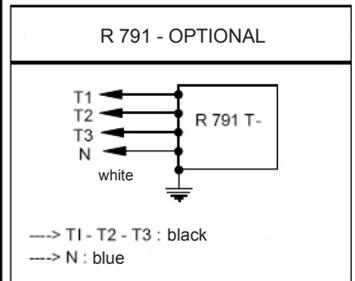
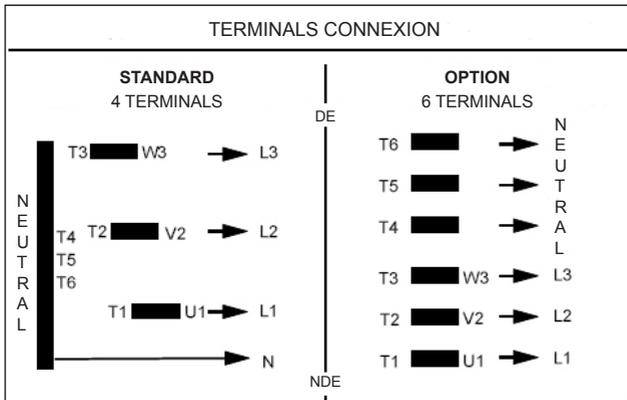
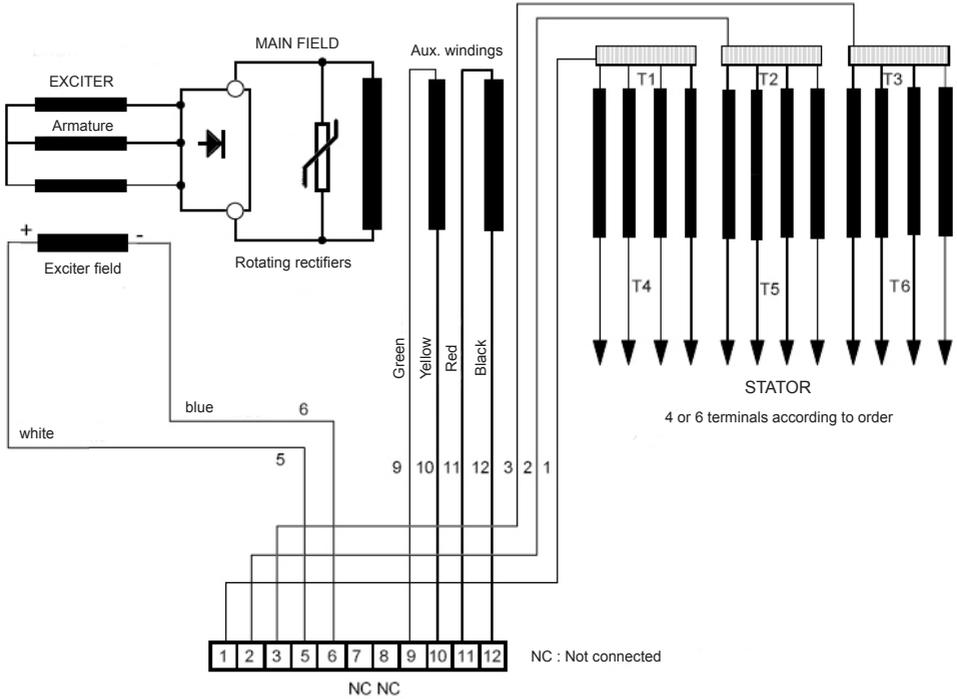
For anti-clockwise rotation, swap 2 and 3.

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

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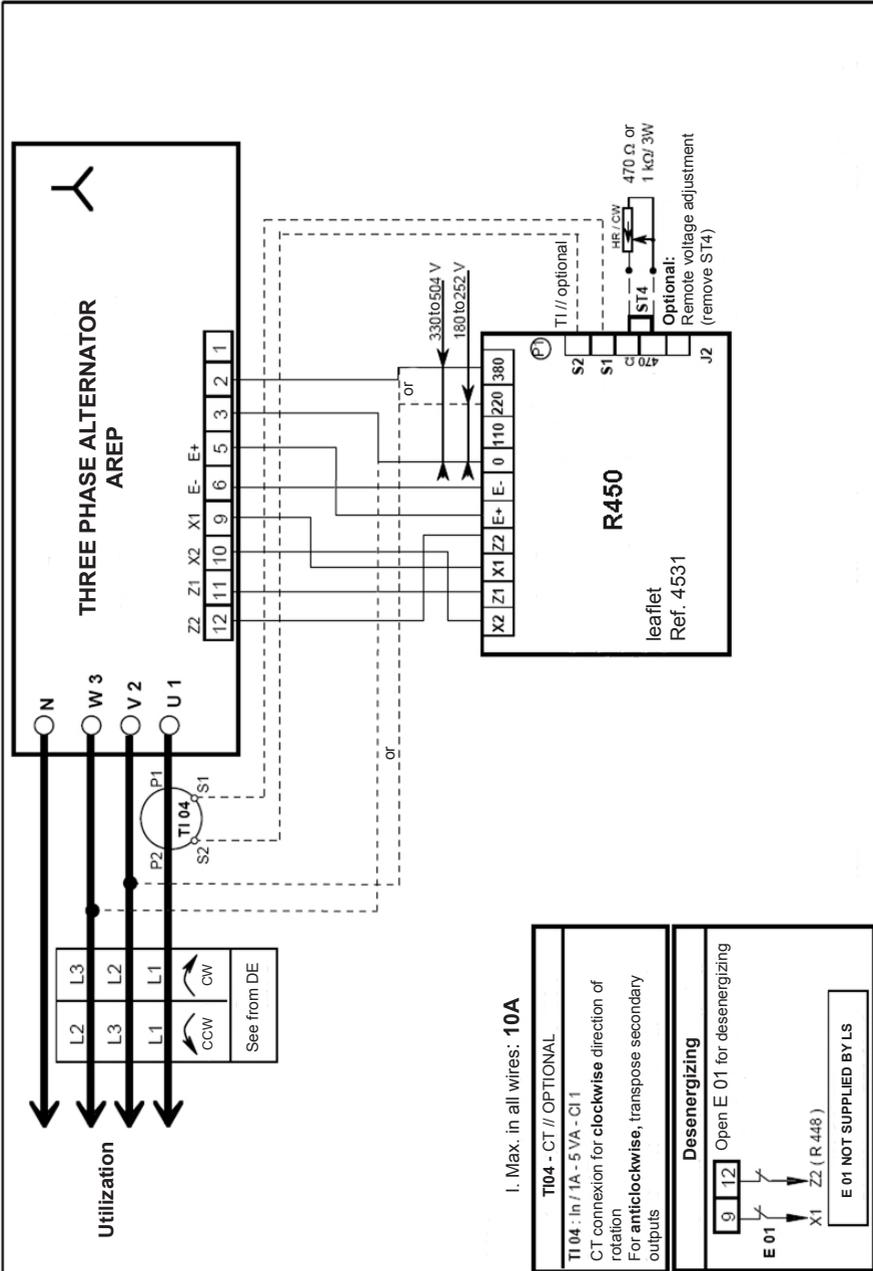
### 3.3 - Terminal connection diagrams



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• A.V.R. connection



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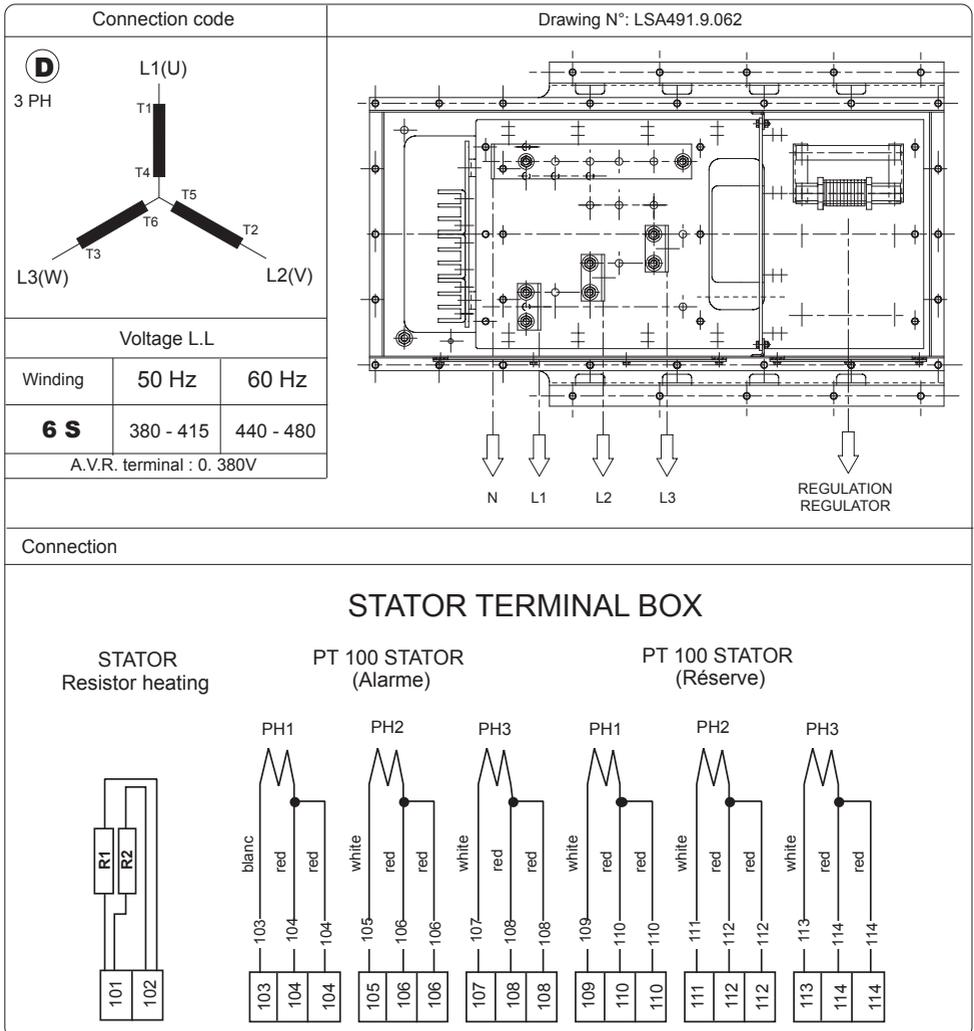
### 3.4 - Internal coupling

- Standard terminal connection: 6-wire



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

In no case should the internal connections in the terminal box be subjected to stresses due to cables connected by the user.



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## Low Voltage Alternator - 4 pole

### • 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 protection devices in place have not been tripped.
- If there is an external AVR, the connections between the alternator and the cabinet are made in accordance with the connection diagram.
- There is no short-circuit phase-phase or phase-neutral between the alternator output terminals and the generator set control cabinet (part of the circuit not protected by circuitbreakers or relays in the cabinet).
- The machine should be connected with the busbar separating the terminals as shown in the terminal connection diagram.



- The alternator earth terminal inside the terminal box is connected to the electrical earth circuit
  - The earth terminal is connected to the frame.
- The connections inside the terminal box must never be subjected to stress due to cables connected by the user.



Diameter	M6	M8	M10	M12
Torque	4 Nm	10 Nm	20 Nm	35 Nm
Tolerance	± 15%			

### 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 up at the factory. When first used with no load, make sure that the drive speed is correct and stable (see the nameplate). With the regreasable bearing option, we recommend greasing the bearings at the time of commissioning (see section 4.5).

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 3.6). If the machine still operates incorrectly, the cause of the malfunction must be located (see section 4.8).

### 3.6 - Setting up



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

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### 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.



**Warning : During and after running, the alternator will reach temperatures hot enough to cause injury, such as burns.**

#### 4.2 - Routine maintenance

##### • 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.

#### 4.3 - Air/air heat exchanger

##### • 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 motoventilator mounted on the exchanger casing.

##### • 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).

##### • Performances

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

##### • 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.

##### • 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.

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#### 4.4 - Air/water heat exchanger

##### • Description of the cooler

losses (mechanical, ohmic...). The exchanger is located on the top of the machine.

Normal operation :

the air is pulsed by a fan fixed to the synchronous machine shaft. The air goes through the exchanger, rendering its calories.

##### AIR / WATER double tube exchanger:

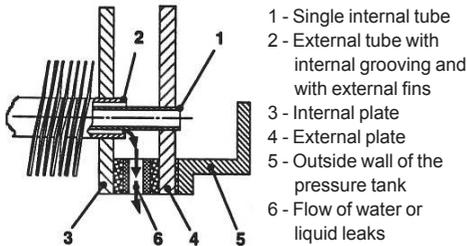
The double-tube technique keeps the cooling circuit from being affected by possible water leakage. The double tube provides a high safety level. In case of leakage, the water goes from the inside of the internal tube to the coaxial space between the two tubes. The water is drained axially to a leakage chamber where it may activate a sensor.

An exchanger is comprised of a fin-tube block containing:

- a steel frame,
- a fin-tube block crimped mechanically to the tubes.

The tube bundle is roll-expanded in the end plates (parts 3 and 4).

The water distribution in the tubes is provided by two removable water boxes (part 5). A water box is equipped with collars for fitting the inlet and outlet lines. Neoprene seals ensure the watertightness between the water boxes and the end plates.



- 1 - Single internal tube
- 2 - External tube with internal grooving and with external fins
- 3 - Internal plate
- 4 - External plate
- 5 - Outside wall of the pressure tank
- 6 - Flow of water or liquid leaks

##### AIR / WATER single tube exchanger:

An exchanger is comprised of a fin-tube block containing :

- a steel frame,

- a fin-tube block crimped mechanically onto the tubes.

The tube bundle is roll-expanded in the end plates.

The water distribution in the tubes is provided by two removable water boxes. One water box is equipped with collars for fitting the inlet and outlet water lines.

Neoprene seals provide watertightness between the water boxes and the end plates.

##### • Maintenance of the water-cooler

The frequency of cleaning operations depends essentially on the purity of the water used. We recommend a minimum of one inspection per year.

Stop the machine.

Cut off the power supply by isolating the inlet and outlet lines, and drain the water.

Disconnect the leak sensor (option with double-tube cooler), and make sure that there are no leaks.

Remove the water boxes on each side of the machine.

Rinse and brush each water box.

Note : do not use a hard wire brush as this will remove the protective oxidation layer which has formed on the surfaces of the water boxes.

Clean each tube with a metal scraper ; rinse in soft water.

Keep the leakage chamber dry (double-tube water-cooler only).

##### • Leak detection for a double-tube exchanger

If a leak is detected, it is necessary to ascertain its origin immediately and repair it. Remove the two water boxes, apply a slight positive pressure in the leakage chamber, thus between the two tubes (only concerns the double-tube coolers).

If a tube is damaged : plug it at BOTH ends. Use a tapered plug.

The plug should preferably be made of salt-water resistant aluminium bronze or of a synthetic material.

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### • Servicing the water-cooler

#### Cooler removal:

The cooler unit is slid into the box caisson. It is possible to remove the cooler from the caisson without removing the water boxes. The cooler is fastened to the caisson via a series of screws on the water box. Remove the supply and return pipes. Provide two supports to hold the cooler when it comes out of its housing. Remove the cooler using slings that can be attached to the connecting flanges.

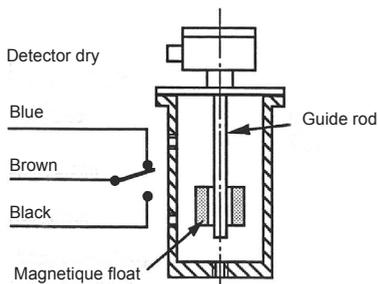
#### Cooler re-assembly:

Carry out the operations of the «Cooler removal» chapter in the reverse order. Be careful to push the cooler completely into its housing before tightening the fastening screws of the cooler to the caisson.

### • Cooler protection devices (depending on option)

#### Leak detection (float system):

A magnet float activate a switch located into the float guiding rod.

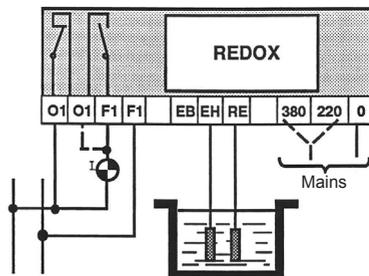


#### Leak detection (electrode system):

The REDOX 69 system measures the apparent resistance of the fluid whose leakage is to be checked.

By apparent resistance is meant the resistance between the electrodes of the system when they are immersed in their receptacle. The current which circulates is used to activate a relay.

Contact	Electrodes submerged	Electrodes dry Relay not excited
O1-O1	open	closed
F1-F1	closed	open



### 4.5 - 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 <sup>3</sup>	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.

### • 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.

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### 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 re-assembling the machine.

#### • 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).

### 4.6 - 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.

### 4.7 - Mechanical defects

Fault		Action
Bearing	Excessive overheating of one or both bearings (bearing temperature 80°C above the ambient temperature)	<ul style="list-style-type: none"> <li>- If the bearing has turned blue or if the grease has turned black, change the bearing</li> <li>- Bearing not fully locked (abnormal play in the bearing cage)</li> <li>- End shields incorrectly aligned</li> </ul>
Abnormal temperature	Excessive overheating of alternator frame (more than 40° C above the ambient temperature)	<ul style="list-style-type: none"> <li>- Air flow (inlet-outlet) partially clogged or hot air is being recycled from the alternator or engine</li> <li>- Alternator operating at too high a voltage (&gt;105% of Un on load)</li> <li>- Alternator overloaded</li> </ul>
Vibrations	Too much vibration	<ul style="list-style-type: none"> <li>- Misalignment (coupling)</li> <li>- Defective mounting or play in coupling</li> <li>- Rotor balancing fault (Engine - Alternator)</li> </ul>
	Excessive vibration and humming noise coming from the machine	<ul style="list-style-type: none"> <li>- Phase imbalance</li> <li>- Stator short-circuit</li> </ul>
Abnormal noise	Alternator damaged by a significant impact, followed by humming and vibration	<ul style="list-style-type: none"> <li>- System short-circuit</li> <li>- Misparalleling</li> </ul> <p>Possible consequences</p> <ul style="list-style-type: none"> <li>- Broken or damaged coupling</li> <li>- Broken or bent shaft end</li> <li>- Shifting and short-circuit of main field</li> <li>- Fan fractured or coming loose on shaft</li> <li>- Irreparable damage to rotating diodes/AVR, surge suppressor</li> </ul>

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### Low Voltage Alternator - 4 pole

#### 4.8 - 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 / PMG < 10V	- Check the speed (or LAM set too high)
		Voltage between E+ and E- AREP / PMG > 15V	- Faulty rotating diodes - Short-circuit in the main field (check the resistance) - Faulty exciter armature
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

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## Low Voltage Alternator - 4 pole

### • Checking the winding

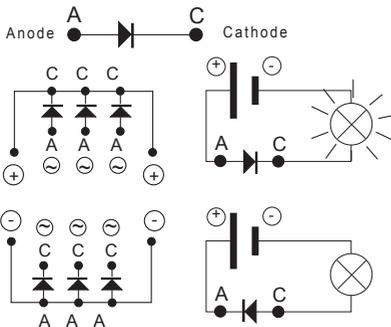
You can check the winding insulation by performing a high voltage test. In this case, you must disconnect all AVR wires.

### WARNING

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

### • Checking the diode bridge

A diode in good working order should allow the current to flow only in the anode-to-cathode direction.



### • Checking the windings and rotating diodes using separate excitation



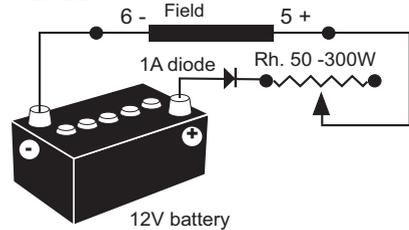
During this procedure, make sure that the alternator is disconnected from any external load and inspect the terminal box to check that the connections are fully tightened.

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 exciter field wires (5+) and (6-).

ASSEMBLY A



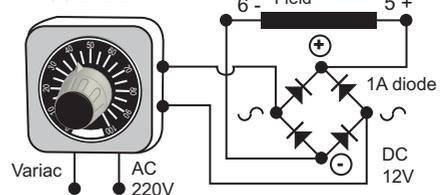
**Assembly B:** Connect a "Variac" variable power supply and a diode bridge on both exciter field wires (5+) and (6-).

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

3) Run the unit at its rated speed.

4) Gradually increase the exciter 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 (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).

ASSEMBLY B



# LSA R/H 49.1

## Low Voltage Alternator - 4 pole

### 4.9 - 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.

#### • 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

#### • Screw tightening torque

IDENTIFICATION	screw Ø	Torque N.m
Exciter screw	M6	8.3
Diode / Star bridge	M6	10
Diode nut	M6	3
DE shield / frame screw	M12	70
NDE shield / frame screw	M12	70
Bush / casing	M12	70
Earth screw	M12	35
Grille screws	M6	4
Cover screws	M6	5
Stator connection nut	M12	35

#### • Access to diodes

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

If the diodes are faulty :

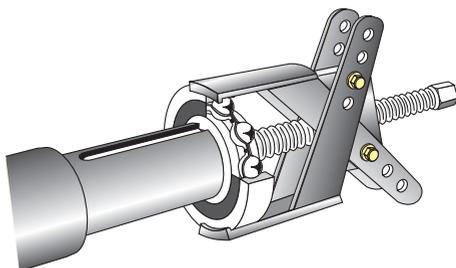
- Remove the surge suppressor (347).
- Remove the 6 «H» mounting nuts for the diode assembly on the support.
- Change the fitted caps, respecting the polarity.

#### • Access to connections and the regulation system

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

#### • 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.
- On LSA R :
- Dismantle the air intake grid (50).
  - Dismantle the air turbine (118).
  - Dismantle the air turbine cover (117).
  - Remove the V-Ring gasket (249).
- On LSA H : Remove external cap (71).
- 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.**

#### • 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.

# LSA R/H 49.1

## Low Voltage Alternator - 4 pole

- Fit the new bearing, after heating it by induction at approximately 80°C.

### WARNING

**Replace the dismantled bearing with a new one.**

#### • Complete dismantling

- Take out the NDE bearing following the instructions in section above.
- Take out the DE bearing following the instructions in section above.
- Remove the access plates (140).
- Remove the lubricating tubes (77).
- Dismantle the mill tube case (116) on LSA R or exchanger (11h + 11s LSA H).
- 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.

#### • 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 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.

#### 4.10 - 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).

#### • Resistances of main windings at 20°C ( $\Omega$ )

Average values for 6S winding (6 wires)

Type	Stator L/N	Rotor	Field	Armature
L6	0.0029	0.38	12	0.08
L9	0.0021	0.43	12	0.08

#### • Field excitation current $i_{exc}$ (A)

Type	No load	At rated load
L6	0.5	2.2
L9	0.9	2.2

#### • Voltage of auxiliary windings at no load

Type	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.

# LSA R/H 49.1

## Low Voltage Alternator - 4 pole

### 5 - SPARE PARTS

#### 5.1 - First maintenance parts

Emergency repair kits are available as an option.

They contain the following items :

Emergency kit AREP	ALT 491 KS 001
AVR R450	-
Diode bridge assembly	-
Surge suppressor	-

Single-bearing kit	ALT 491 KB 002
Non drive end bearing	-
«O» ring	-
Preloading (wavy) washer	-

Double-bearing kit	ALT 491 KB 001
Non drive end bearing	-
Drive end bearing	-
«O» ring	-
Preloading (wavy) washer	-

In the event of failure to comply with this advice, the manufacturer cannot be held responsible for any damage.



**After operational testing, it is essential to replace all access panels or covers.**

#### 5.2 - Technical support service

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

For all spare parts orders or technical support requests, send your request to [service.epg@leroy-somer.com](mailto:service.epg@leroy-somer.com) or your nearest contact, whom you will find at [www.lrsm.co/support](http://www.lrsm.co/support) indicating the complete type of machine, its number and the information indicated on the nameplate.

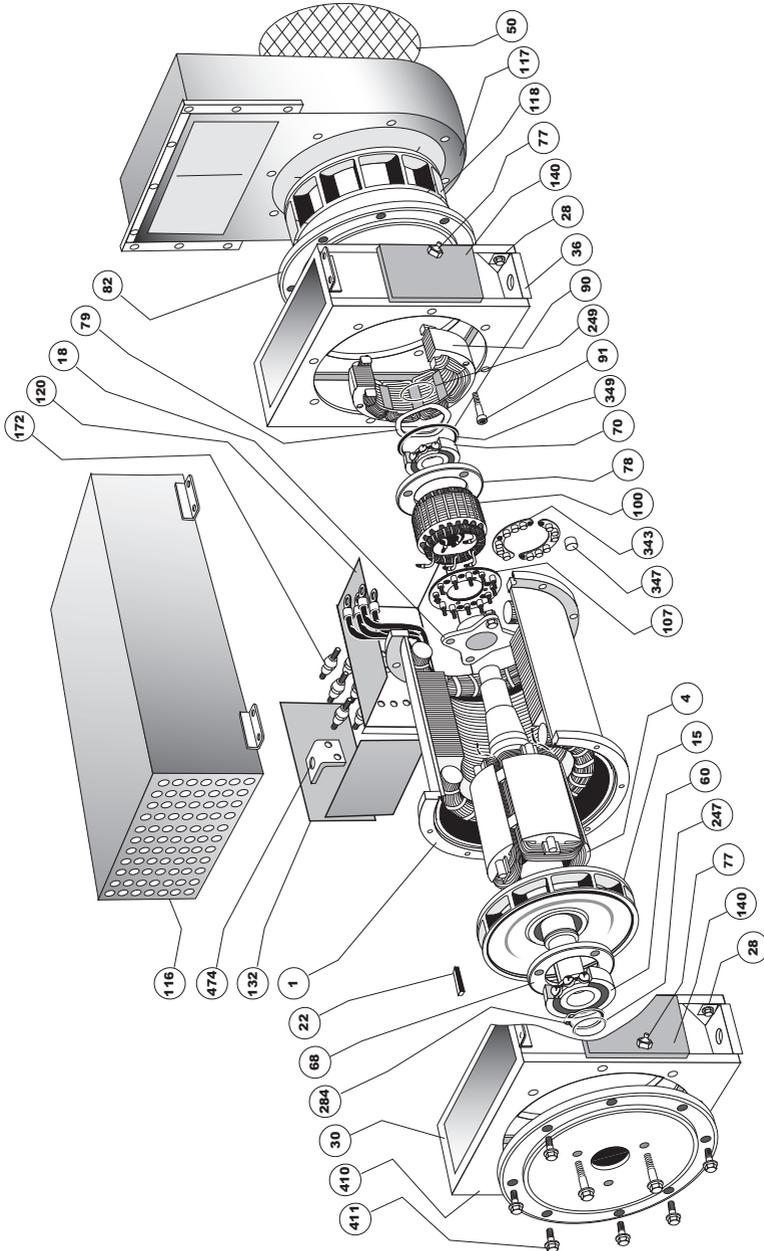
Part numbers should be identified from the exploded views and their description from the parts list.

To ensure that our products operate correctly and safely, we recommend the use of original manufacturer spare parts.

# LSA R/H 49.1

## Low Voltage Alternator - 4 pole

### 5.3 - Exploded view: air/air heat exchanger



# LSA R/H 49.1

## Low Voltage Alternator - 4 pole

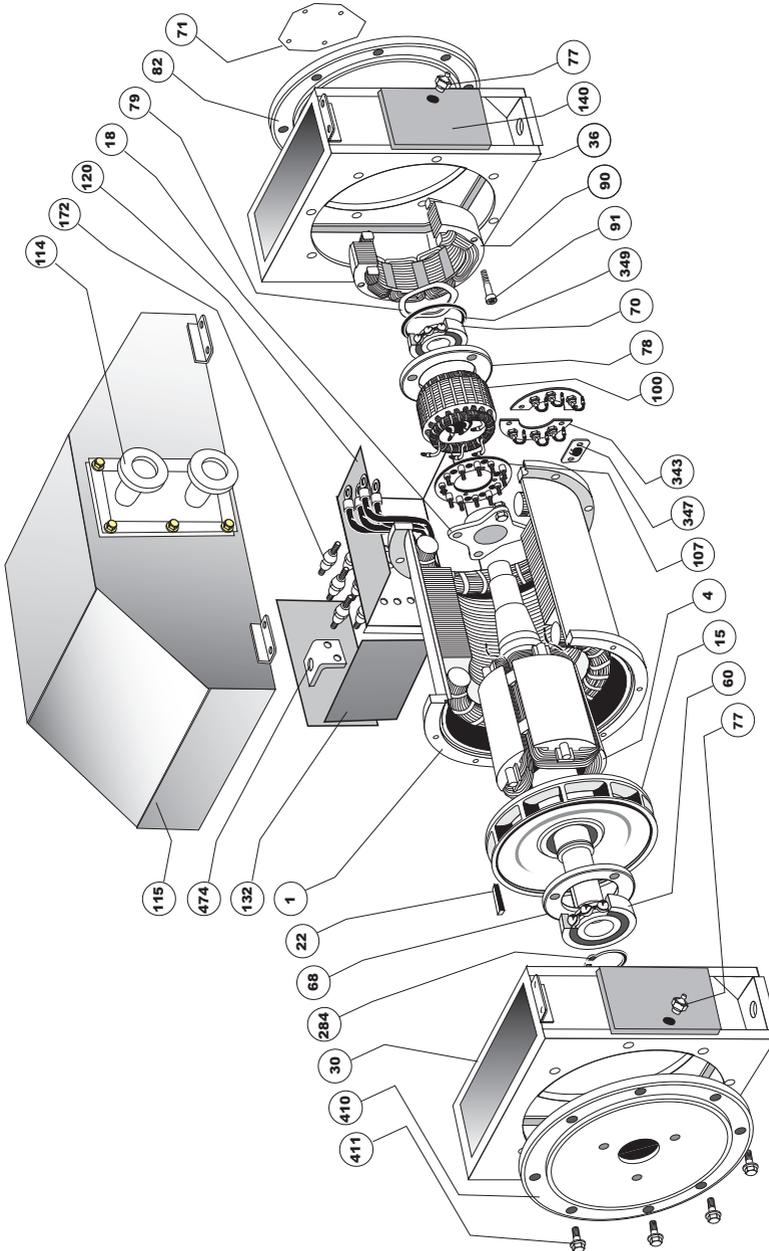
### 5.4 - Parts list

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

# LSA R/H 49.1

## Low Voltage Alternator - 4 pole

### 5.5 - Exploded view: air/water heat exchanger



# LSA R/H 49.1

## Low Voltage Alternator - 4 pole

### 5.6 - Parts list

Ref.	Qty	Description	Ref.	Qty	Description
1	1	Stator assembly	91	4	Fixing screws
4	1	Rotor assembly	100	1	Exciter armature
15	1	Turbine	107	1	Diode assembly support
18	1	Balancing disc	114	1	Cooling system
22	1	End shaft key	115	1	Cooling system box
30	1	Bearing interconnection side	120	1	Terminal support
36	1	Bearing exciter side	132	1	Terminal box
60	1	DE bearing	140	2	Diode access door
68	1	Inner cap	172	-	Terminal
70	1	NDE bearing	284	1	Circlips
71	1	External cap	343	1	Diode bridge assembly
77	2	Lubrication	347	1	Protection varistor (+ C.T.)
78	1	Inner cap	349	1	«O» ring
79	1	Preloading wavy washer	410	1	DE bearing housing
82	1	Rear flange bearing	411	8	Fixing screws
90	1	Exciter field	474	3	Departure band

# LSA R/H 49.1

## Low Voltage Alternator - 4 pole

# LSA R/H 49.1

## Low Voltage Alternator - 4 pole

### Disposal and recycling instructions

We are committed to limiting the environmental impact of our activity. We continuously monitor our production processes, material sourcing and product design to improve recyclability and minimise our environmental footprint.

These instructions are for information purposes only. It is the user's responsibility to comply with local legislation regarding product disposal and recycling.

The oil and grease from the lubrication system should be treated as hazardous waste and must be treated in accordance with local legislation.

### Recyclable materials

Our alternators are mainly constructed from iron, steel and copper materials, which can be reclaimed for recycling purposes.

These materials can be reclaimed through a combination of manual dismantling, mechanical separation and melting processes. Our technical support department can provide detailed directions on how to dismantle products on request.

### Waste & hazardous materials

The following components and materials require special treatment and must be separated from the alternator before the recycling process:

- electronic materials found in the terminal box, including the automatic voltage regulator (198), current transformers (176), interference suppression module (199) and other semi-conductors.
- diode bridge (343) and surge suppressor (347), found on the alternator rotor.
- major plastic components, such as the terminal box structure on some products. These components are usually marked with information concerning the type of plastic.

All materials listed above need special treatment to separate waste from reclaimable materials and should be entrusted to specialist recycling companies.

# LSA R/H 49.1

## Low Voltage Alternator - 4 pole

# Service & Support

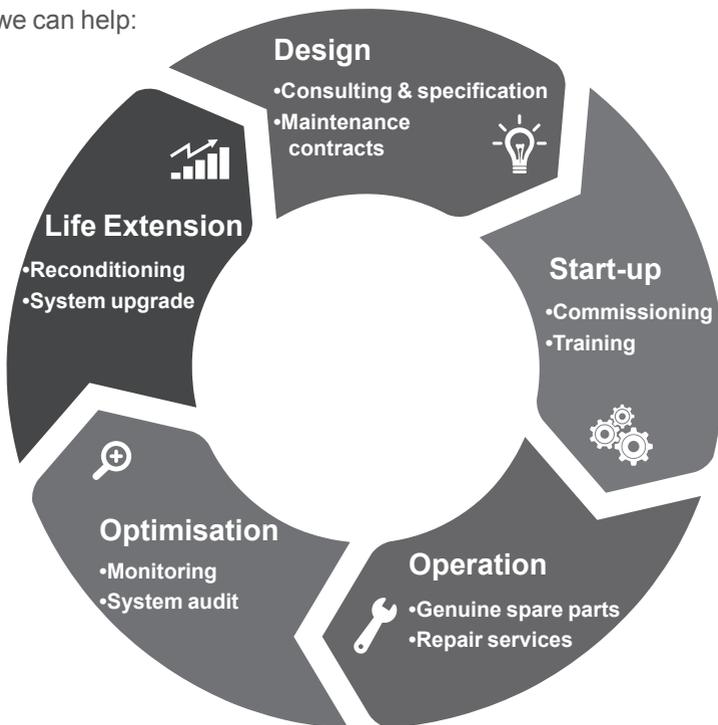
Our worldwide service network of over 80 facilities is at your service.

This local presence is our guarantee for fast and efficient repair, support and maintenance services.

Trust your alternator maintenance and support to electric power generation experts. Our field personnel are 100% qualified and fully trained to operate in all environments and on all machine types.

We have a deep understanding of alternator operation, providing the best value service to optimise your cost of ownership.

Where we can help:



Contact us:

**Americas:** +1 (507) 625 4011

**Europe & Rest of the world:** +33 238 609 908

**Asia Pacific:** +65 6250 8488

**China:** +86 591 88373036

**India:** +91 806 726 4867

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