

## LSF 46.2 ALTERNATORS

Installation and maintenance

# LSF 46.2

## 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 world's leading manufacturer, 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 work 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 which may damage or destroy the machine or surrounding equipment.



Warning symbol for general danger to personnel.



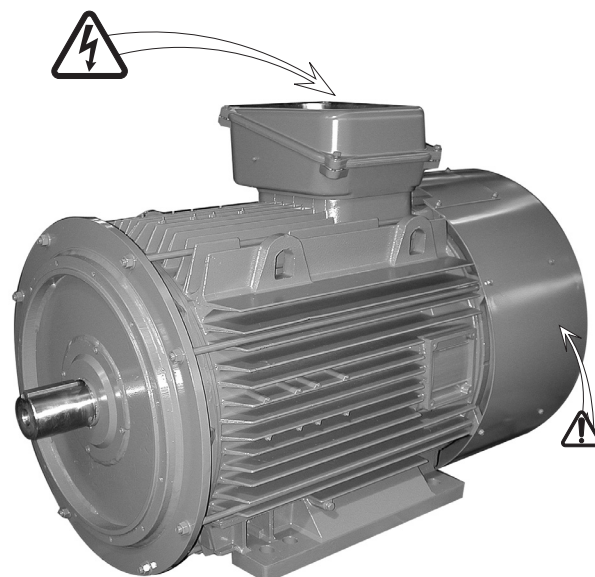
Warning symbol for electrical danger to personnel.

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.

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.



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# LSF 46.2 ALTERNATORS

## 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 60034-1, (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.

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.

### 1.2 - Inspection

On receipt of your alternator, check that it has not suffered any damage in transit. If there are obvious signs of damage, contact the carrier (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 frame (see drawing).

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

The machine name is defined according to various criteria, for example : LSF 46.2 M5 C6/4 -

- LSF : IP 55
- 46.2 : machine type
- M5 : model
- C : excitation system (AREP)
- 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.

### 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.

<b>ALTERNATEURS PARTNER ALTERNATORS</b>	
<p>LSA <input type="text"/> Date <input type="text"/></p> <p>N <input type="text"/> Hz</p> <p>Min-1/R.P.M. <input type="text"/> Protection <input type="text"/></p> <p>Cos Ø /P.F. <input type="text"/> Cl. ther. / Th.class <input type="text"/></p> <p>Régulateur/A.V.R. <input type="text"/></p> <p>Altit. <input type="text"/> m Masse / Weight <input type="text"/></p> <p>Rlt AV/D.E bearing <input type="text"/></p> <p>Rlt AR/N.D.E bearing <input type="text"/></p> <p>Graisse / Grease <input type="text"/></p> <p>Valeurs excit / Excit. values <input type="text"/></p> <p>en charge / full load <input type="text"/></p> <p>à vide / at no load <input type="text"/></p>	<p style="text-align: center;"><b>PUISSANCE / RATING</b></p> <p>Tension Voltage <input type="text"/> <input type="text"/> <input type="text"/> V</p> <p><input type="text"/> <input type="text"/> <input type="text"/> Ph.</p> <p>Connex. <input type="text"/> <input type="text"/> <input type="text"/></p> <hr/> <p>Continue <input type="text"/> <input type="text"/> <input type="text"/> kVA</p> <p>Continuous <input type="text"/> <input type="text"/> <input type="text"/> kW</p> <p><b>40C</b> <input type="text"/> <input type="text"/> <input type="text"/> A</p> <hr/> <p>Secours <input type="text"/> <input type="text"/> <input type="text"/> kVA</p> <p>Std by <input type="text"/> <input type="text"/> <input type="text"/> kW</p> <p><b>27C</b> <input type="text"/> <input type="text"/> <input type="text"/> A</p> <p style="text-align: center;">(*) Tension maxi. / maximum voltage</p>
<span style="margin: 0 10px;">LR 0021</span> <span style="margin-left: 20px;">Conforme à C.E.I 34-1(1994). According to I.E.C 34-1(1994).</span>	

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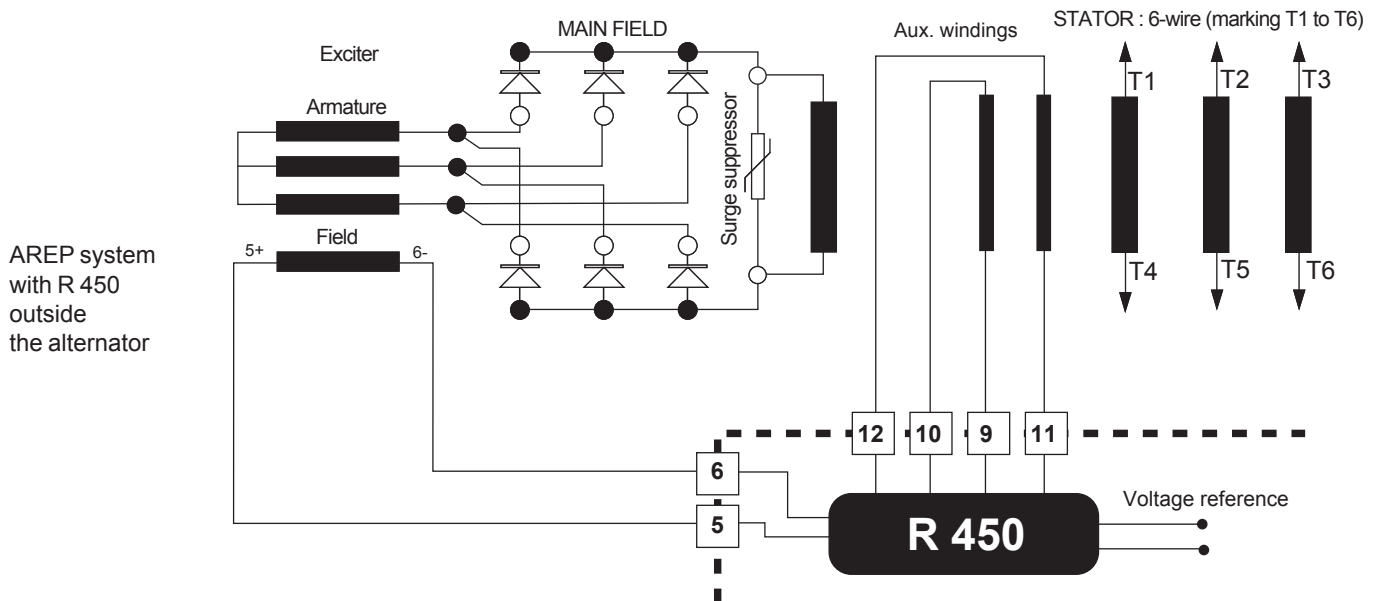
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## 2 - TECHNICAL CHARACTERISTICS

### 2.1 - Electrical characteristics

LSF alternator is 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 version (see diagrams).



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

#### 2.1.1 - Options

- Regreasable ball bearings
- Stator temperature detection probes
- Space heaters

### 2.2 - Mechanical characteristics

- Aluminium frame
- Cast iron end shields
- Ball bearings greased for life
- B 34 : two-bearing with SAE 2 flange and standard cylindrical shaft extension.
- Drip-proof machine, self-cooled
- Degree of protection : IP 55
- Space heaters

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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.

##### 3.1.1 - Handling

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

##### 3.1.2 - Coupling

- Semi-flexible coupling

Careful alignment of the machines is recommended, checking that the concentricity and parallelism of both parts of the coupling does not exceed 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 > 40°C, apply a derating coefficient).

### 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 several possible methods for restoring these minimum values.

a) Dry out the machine for 24 hours in a drying oven at a temperature of 110 °C .

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

- Short-circuit the three output power terminals using connections capable of supporting the rated current (try not to exceed 6 A/mm<sup>2</sup>)

- Insert a clamp ammeter to monitor the current passing through the short-circuit connections.

- Connect a 24 Volt battery in series with a rheostat of approximately 10 ohms (50 W) to the exciter field terminals, respecting the polarity.

- 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 louvres and housing are correctly positioned

- 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

To modify the connections, change the position of the terminal links or shunts. 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.**

### 3.3.1 - Terminal connection

Connection codes	Factory connection	
<p><b>(D)</b> 3-phase</p>		
<p><b>(C)</b> 3-phase or 1 phase</p>		<p>3-phase L1 - L2 - L3 or 1 phase L2 - L3</p>
<p> In case of reconnection, ensure that AVR voltage detection is correct (§ 2.3.1).</p>		

### 3.3.2 - Option connection diagram

R 791 T interference suppression kit (standard for CE marking)	Remote voltage potentiometer																				
<p>Connections</p> <table border="0"> <tr> <td>Black</td> <td>→</td> <td><b>(D)</b> T1</td> <td><b>(C)</b> T1</td> </tr> <tr> <td>Black</td> <td>→</td> <td>T2</td> <td>T2</td> </tr> <tr> <td>Black</td> <td>→</td> <td>T3</td> <td>T3</td> </tr> <tr> <td>Blue</td> <td>→</td> <td>N</td> <td>⏏</td> </tr> <tr> <td>White</td> <td>→</td> <td>⏏</td> <td>⏏</td> </tr> </table>	Black	→	<b>(D)</b> T1	<b>(C)</b> T1	Black	→	T2	T2	Black	→	T3	T3	Blue	→	N	⏏	White	→	⏏	⏏	<p><b>ST4</b> Voltage adjustment via remote potentiometer.</p>
Black	→	<b>(D)</b> T1	<b>(C)</b> T1																		
Black	→	T2	T2																		
Black	→	T3	T3																		
Blue	→	N	⏏																		
White	→	⏏	⏏																		

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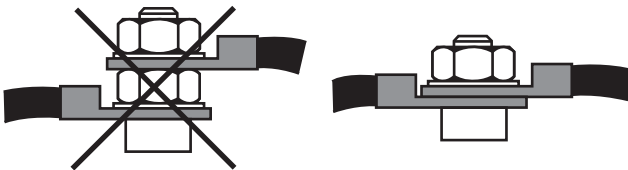
### 3.3.3 - Connection checks



**Electrical installations must comply with the current legislation 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.



### 3.3.4 - Electrical checks on the AVR

- Check that all connections have been made properly as shown in the attached connection diagram.

### 3.4 - Commissioning



**The machine can only be started up and used if the installation has been set up 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). With the greaseable ball bearings option, we recommend greasing the bearings at the time of commissioning (see 4.2.3).

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).

### 3.5 - 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<sup>-1</sup> / 50Hz or 1800 min<sup>-1</sup> / 60 Hz.**

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



**After operational testing, replace all access panels or covers.**

The AVR should be 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 condition.



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 understand how the operating system works.

#### 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 condition 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 greasable (option). It is advisable to lubricate the machine during operation. Time intervals and quantity of grease are given in the table below.

DE bearing	6316 C3
Quantity of grease	33 g
Lubrication interval	4000 H
NDE bearing	6315 C3
Quantity of grease	30 g
Lubrication interval	4500 H

Lubrication intervals are given for a grease of grade LITHIUM - standard - NLGI 3.

The factory lubrication is performed with grease : SHELL - ALVANIA G3.

Before using another grease, check for compatibility with the original one. Monitor the temperature rise in the bearings, which should not exceed 50°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)
- Toluene (slightly toxic); inflammable
- Benzene (or benzine, toxic); inflammable
- Cyclohexane (non toxic); inflammable

##### 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.

##### 4.2.5 - 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.

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 chlorethylene can also be used.

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

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### 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 defects

Fault		Action
Bearing	Excessive overheating of one or both bearings (bearing temperature 50°C above the ambient temperature) (With or without abnormal bearing noise)	<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>- Mis-paralleling</li> </ul> Possible consequences <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 or AVR.</li> </ul>

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### 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- (DC) 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. Check the resistance.
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

#### 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.

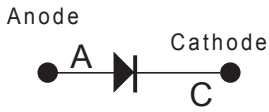
**WARNING**

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

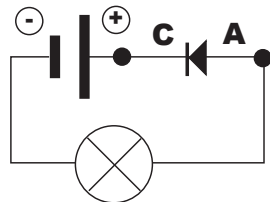
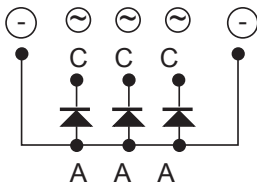
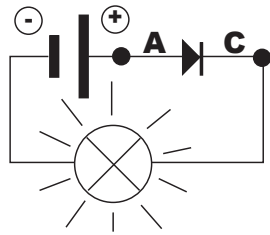
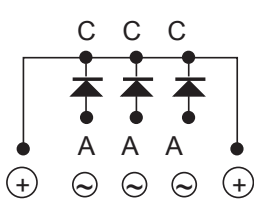
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## 4.5.2 - Checking the diode bridge

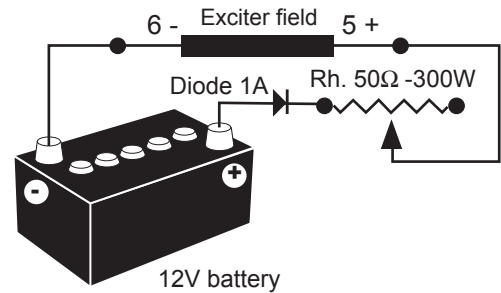
### DIODE BRIDGE



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



### 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).

## 4.5.3 - Checking the windings and rotating diodes using separate excitation



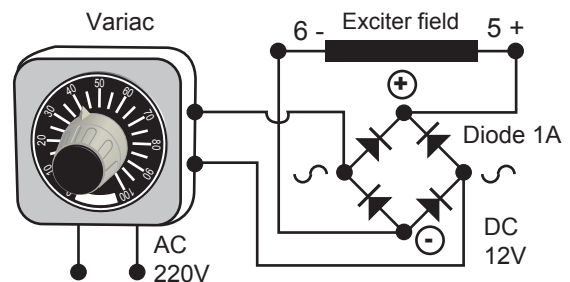
During this procedure, make sure that the alternator is disconnected from any external load and inspect the terminal box to check that the connections are fully tightened.

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

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



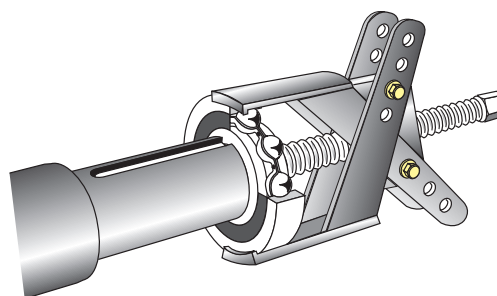
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### 4.6 - Dismantling, reassembly (see section 5.4.)

#### WARNING

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



#### 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 : 8 mm, 10 mm, 18 mm,
- 1 socket set : 8, 10, 13, 16, 18, 21, 24, 30 mm,
- 1 socket with male ferrule : 5 mm,
- 1 puller.

#### 4.6.2 - Access to diodes

- Remove inspection door (52) and (38).
- Disconnect the diodes.
- Check the diodes using an ohmmeter or a battery lamp (see section 4-5)

If the diodes are faulty

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

#### 4.6.3 - Access to connections

Access directly by removing the terminal box cover (136).

#### 4.6.4 - Replacing NDE bearing

- Remove the air inlet cover (51).
- Remove the fixing screw (16).
- Remove the support fan (305) and fan (15).
- Remove the nuts of the tie rod (37).
- In the case of regreasable bearing, remove 4 screws (72) from the inner bearing cap (78).
- Extract the NDE bracket (36).
- Remove the ball bearing (70) using a puller with a central screw (see drawing below).
- Check the condition of the «O» ring seal (349) and, if necessary, change it.
- Fit the new bearing, after heating it by induction to approximately 80°C.
- In the case of regreasable bearing, screw in the inner bearing cap and using the tie rod as a guide.
- Mount the bracket
- Fit the inner bearing retainer with appropriate lubrication.
- Tighten the 4 screws on the bearing retainer.
- Fit the fan (15) and the air inlet cover (51).

#### WARNING

When dismantling the machine, always change the bearings.

#### 4.6.5 - Replacing the DE bearing on two-bearing machines

- Remove the fixing screw (62) and the nuts of the tie rod (37).
- Remove the shield (30).
- Remove the circlips (67).
- Remove the ball bearing (60) using a puller with a central screw.
- Fit the new bearing, after heating it by induction to approximately 80°C.
- In case of bearing greasable, screwing in the inner bearing cap a tie rod.
- Mount the bracket
- Fit the inner bearing retainer with appropriate lubrication.
- Tighten the 4 screws on the bearing retainer.

#### WARNING

When dismantling the machine, always change the bearings.

# LSF 46.2

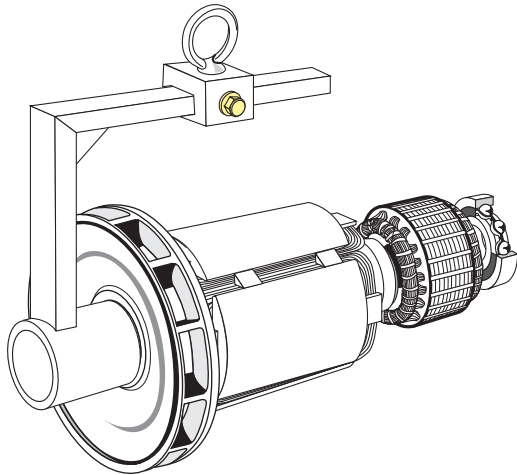
## ALTERNATORS

### 4.6.6 - Complete dismantling

- Remove the DE shield (30) as described in section 4.6.5.
- Support the DE rotor (4) with a strap or a support constructed as shown in the drawing below.



**After operational testing, replace all access panels or covers.**



- Pull the strap in order to move the rotor and ensure its weight is evenly supported.
- Remove the NDE shield following the instructions in section 4.6.4.

### 4.6.7 - Reassembling the end shields

- Place the "O" ring seal (349) and the preloading wavy washer (79) in the bearing seat (36).
- In case of bearing greasable, screwing in the inner bearing cap a tie rod.
- Position shields (30) and (36) on the stator (1).
- Fit the inner bearing retainer with appropriate lubrication.
- Tighten the 4 screws on the bearing retainer.
- Fit the air inlet louvre (51).
- Follow the procedure for the DE shields (30).
- Finish the machine reassembling.

### 4.6.8 - Reassembling the rotor

- Mount the rotor (4) in the stator (1).
- Position shields (30) and (36) on the stator (1).
- Follow the procedure for reassembling the bearing (§ 4.6.7).
- Tighten the tie rod nuts (37).
- Check that the machine is correctly assembled and that all screws are tightened.

**WARNING**

**When removal of the rotor involves changing parts or rewinding, the rotor must be rebalanced.**

# LSF 46.2

## ALTERNATORS

### 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 - Average values

##### Resistance at 20°C ( $\Omega$ )

LSF 46.2	Stator L/N	Rotor	Field	Armature
M3	0,024	0,23	8,8	0,0354
M5	-	0,24	8,8	0,0354
L6	-	0,264	8,8	0,0354
L9	0,012	0,295	8,8	0,0354

##### Resistance of AREP auxiliary windings at 20°C ( $\Omega$ )

LSF 46.2	Auxil wdg : X1, X2	Auxil wdg : Z1, Z2
M3	0,24	0,38
M5	-	-
L6	-	-
L9	0,19	0,32

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

Symbols : "i exc": excitation current of the exciter field.

LSF 46.2	No load	At rated load
M3	1,05	2,25
M5	-	-
L6	-	-
L9	1,11	2,27

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

#### 4.7.2 - Voltage of auxiliary windings at no load

LSF 46.2	Auxil wdg : X1, X2	Auxil wdg : Z1, Z2
50 Hz	70 V	10 V
60 Hz	85 V	12 V

# LSF 46.2

## ALTERNATORS

### 5 - SPARE PARTS

#### 5.1 - First maintenance parts

Emergency repair kits are available as an option.

They contain the following items :

Ref.	Description	Qty	LSF 46.2	Part ref
	Emergency kit	1		
198	AVR	1	R 450	<b>AEM 110 RE 031</b>
343	Diode bridge assembly	1	LSA 471. 9. 07 LSA 471.9.08	<b>ADE 461 EQ 004</b>
347	Surge suppressor	1	LSA 461.9.01	<b>CII 111 PM 005</b>
	AVR fuse	2	250 V - 10 A	<b>PEL 010 FG 008</b>
	Other spare parts			
60	DE bearing	1	6316 2RS/C3	<b>RLT 080 TS030</b>
70	NDE bearing	1	6315 2RS/C3	<b>RLT 075 TS030</b>

#### 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.

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.

#### 5.3 - Accessories

##### 5.3.1 - Space heater for use when stopped

The space heater must start up as soon as the alternator stops. It is installed at the rear of the machine. Its standard power is 250W with 220V or 250W with 110V on request.

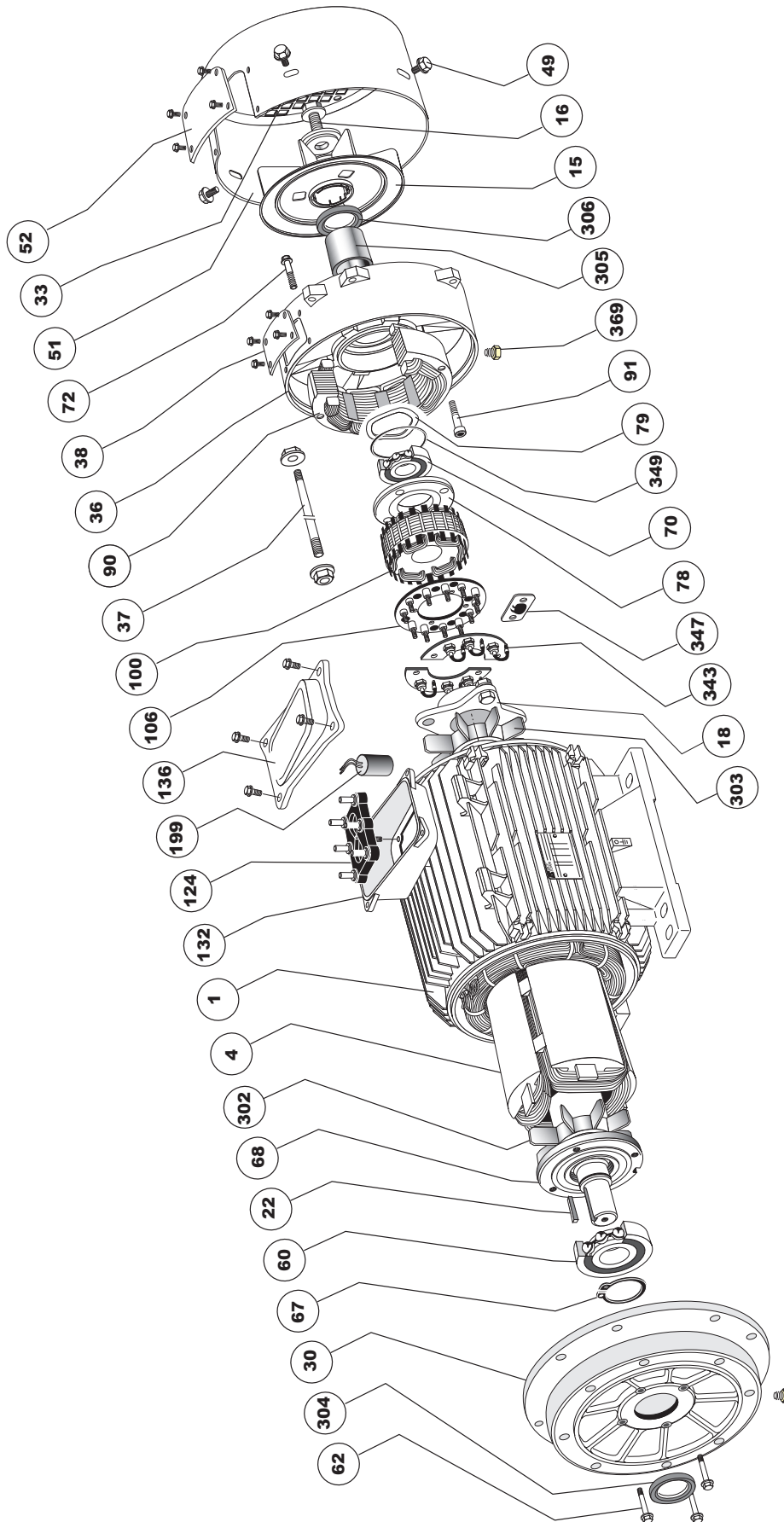


**Warning : the power supply is present when the machine has stopped.**



# LSF 46.2 ALTERNATORS

## 5.4 - Exploded view



# LSF 46.2

## ALTERNATORS

### 5.4.1 - Parts list

Ref	Qty	Description	Ref	Qty	Description
1	1	Stator assembly	124	1	Terminal plate
4	1	Rotor assembly	132	1	Terminal box
15	1	Fan	136	1	Terminal box cover
16	1	Fixing screw	199	1	Interference suppression kit
18	1	Balancing disc	302	1	DE fan
22	1	Shaft extension key	303	1	NDE fan
30	1	DE shield	304	1	DE «V ring» joint
33	1	Air inlet screen	305	1	Fan hub
36	1	Exciter end shield	306	1	NDE «V ring» joint
37	8	Tie rod + nuts	343	1	Diode bridge assembly
38	1	Inspection door	347	1	Protection varistor (+ PCB)
49	16	Cover screws	349	1	“O” ring
51	1	Air intake louvre	369	2	Drain plug
52	1	Inspection door			
60	1	DE bearing			
62	4	Fixing screw			
67	1	Circlips			
68	1	Inner bearing retainer			
70	1	NDE bearing			
72	4	Fixing screw			
78	1	Inner bearing retainer			
79	1	Preloading wavy washer			
90	1	Exciter field			
91	4	Fixing screw			
100	1	Exciter armature			
106	1	Crescent support			

# LSF 46.2

## ALTERNATORS



### Electric Power Generation

### DECLARATION of COMPLIANCE related to CE marking

This Declaration applies to the generators designed to be incorporated into machines complying with the Machine Directive Nr 2006/42/CE dated 17 May 2006.

MOTEURS LEROY-SOMER  
Boulevard Marcellin Leroy  
16015 ANGOULEME (France)

Declares hereby that the electric generators of the ranges " PARTNER", Industrial and Professional, as well as their derivatives, manufactured by Leroy Somer or on Leroy Somer's behalf, comply with the following International Standards and Directives :

- EN et CEI 60034 -1 et 60034 -5
- ISO 8528 – 3 " Reciprocating internal combustion engine driven alternating current generating sets. Part 3. Alternating current generators for generating sets "
- The Low Voltage Directive Nr 2006/95/CE dated 12 December 2006.

Furthermore, these generators, designed in compliance with the Machine Directive Nr 2006/42, are therefore able to be incorporated into Electrical Gen-Sets complying with the following International Standards and Directives :

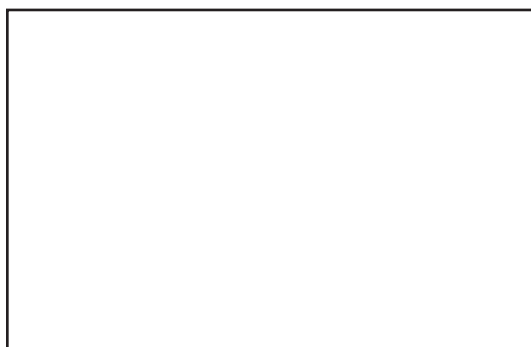
- The Machine Directive Nr 2006/42/CE dated 17 May 2006
- The EMC Directive Nr 2004/108/CE dated 15 December 2004, as intrinsic levels of emissions and immunity are concerned

#### WARNING :

The here above mentioned generators should not be commissioned until the corresponding Gen-Sets have been declared in compliance with the Directives Nr 2006/42/CE et 2004/108/CE, as well as with the other relevant Directives.

#### Technical Managers

P Betge – O Cadel



MOTEURS LEROY-SOMER 16015 ANGOULÊME CEDEX - FRANCE

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

[www.leroy-somer.com](http://www.leroy-somer.com)