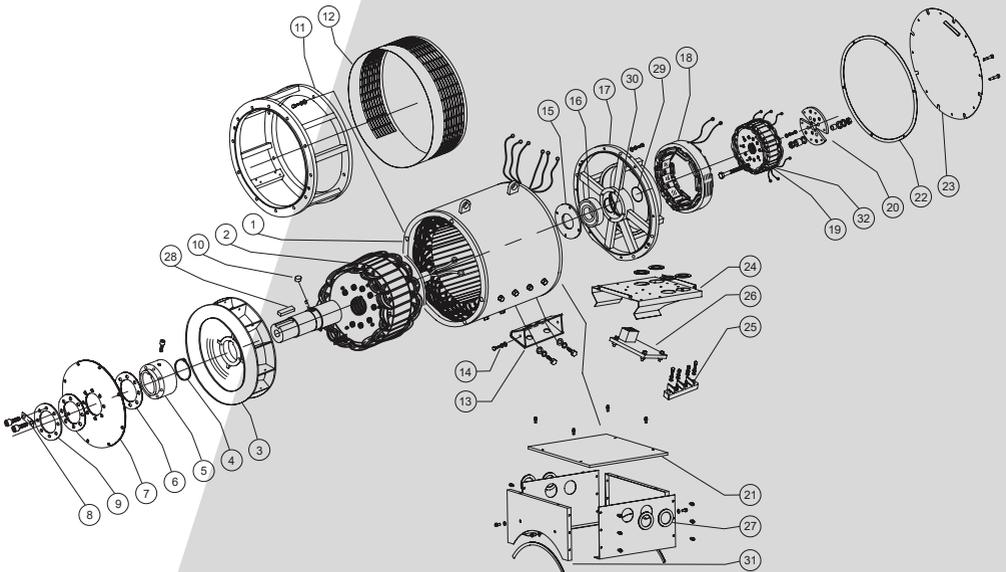




Power



400Hz

High Frequency Alternators

Installation and maintenance

LEROY-SOMER™

400Hz High Frequency Alternators

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.

The alternator is a sub-assembly delivered without a system of protection against short-circuits. The protection must be provided by the circuit-breaker of the generator, sized to interrupt the fault current.

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338 567 258.

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.

This document may not be reproduced in any form without prior authorization.

All brands and models have been registered and patents applied for.

400Hz High Frequency Alternators

CONTENTS

| | |
|---|---|
| 1 - RECEIPT.....4 | 6 - ASSEMBLY OF ALTERNATOR TO PRIME MOVER.....8 |
| 1.1 - Standards and safety measures 4 | 6.1 - Foundation 8 |
| 1.2 - Inspection..... 4 | 6.2 - Alternator mounting single bearing 8 |
| 1.3 - Storage 4 | 6.3 - Alternator mounting double bearing... 8 |
| 1.4 - Applications..... 4 | |
| 1.5 - Usage restrictions 4 | 7 - ELECTRICAL CHECKS9 |
| 1.6 - How to read a machine number..... 4 | 7.1 - Insulation checks 9 |
| 1.7 - Identification..... 4 | 7.2 - Connection checks..... 9 |
| 2 - TECHNICAL CHARACTERISTICS5 | 7.3 - Setting up..... 10 |
| 2.1 - Electrical characteristics 5 | 7.4 - Residual voltage checks 10 |
| 2.2 - Mechanical characteristics..... 5 | 7.5 - Rated voltage and balanced voltage checks 10 |
| 2.3 - Schematic diagram 5 | 7.6 - Connection diagram with D550 digital AVR..... 11 |
| 3 - OPERATING PERFORMANCE6 | 8 - SERVICING - MAINTENANCE.....12 |
| 3.1 - Voltage accuracy and response time.. 6 | 8.1 - Safety measures 12 |
| 3.2 - Voltage adjustment 6 | 8.2 - Routine maintenance 12 |
| 3.3 - Stability adjustment..... 6 | 8.3 - Bearings..... 13 |
| 3.4 - Overload 6 | 8.4 - Mechanical faults 13 |
| 3.5 - Short circuit..... 6 | 8.5 - Electrical faults..... 14 |
| 4 - AUTOMATIC VOLTAGE REGULATOR.....6 | 8.6 - Dismantling and assembly 16 |
| 5 - INSTALLATION AND COMMISSIONING.....7 | 8.7 - Rotating rectifier assembly..... 17 |
| 5.1 - Delivery and storage..... 7 | 8.8 - Table of characteristics 17 |
| 5.2 - Location 7 | 9 - SPARE PARTS18 |
| 5.3 - Foundation 7 | 9.1 - Recommended spares..... 18 |
| 5.4 - Installation..... 7 | 9.2 - Technical support service..... 18 |
| 5.5 - Alignment 8 | 9.3 - Exploded view, parts list and tightening torque 19 |
| 5.6 - Direction of rotation 8 | |
| 5.7 - Terminations and switchgear 8 | Disposal and recycling instructions |

400Hz High Frequency Alternators

1 - RECEIPT

1.1 - Standards and safety measures

Our alternators comply with most international standards.

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).

1.3 - Storage

Prior to commissioning, machines should be stored: away from humidity (< 90%); after a long period of storage, check the machine insulation (see sections 7 and 8.5).

1.6 - How to read a machine number

It is extremely important to properly identify the machine when requesting parts or service. Always have the alternator model number and serial number when requesting information from the factory. We cannot help you without this information.

For example machine n°: TGS3L23A40436-HF

| | | | | | | | | | | | | |
|------------|----------------------------------|-----------|--------|------|-------|---|---|---|---------------|---|---|-------------------|
| TG | S | 3 | L | 2 | 3 | A | 4 | 0 | 4 | 3 | 6 | HF |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| FRAME SIZE | S-SINGLE/ D-DOUBLE BEARING | 3/1 PHASE | RATING | YEAR | MONTH | | | | SERIAL NUMBER | | | HIGH FREQUENCY |

1.7 - Identification

The alternator is identified by means of a nameplate fixed on the machine. 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.

| | | | | | | | | | |
|--|--------------------|--|-------------------|---|-------------------|-------------------|-----|---|--|
|  | | | |  | | | |  TGS3L20120006 - HF | |
| Model | 24 TA 45 L1 | | | Freq. | Hz | 400 | | | |
| S/N | TGS3L 23A 40436-HF | | | Speed | min ⁻¹ | 2000 | | | |
| Date | 2023/01 | | | Voltage | V | 200 | | | |
| Enclosure | IP 23 | | Protection | P4 | | Phase | | 3 | |
| Th. Class | H/H | | Altitude | <1000m | | Connection | | Y | |
| Weight | 830 kg | | PF | 0.8 | | Cont BR | kVA | 140 | |
| AVR | D550 | | Excitation | --- | | | kW | 112 | |
| Excitation 200V/40°C | No Load | | Full Load | | A | 396.2 | | | |
| | 0.9A | | 58V / 3.8A | | | | | | |
| DE bearing | ---- | | | Std by. | kVA | | | | |
| NDE bearing | 6312 2Z C3 | | | | kW | | | | |
| | | | | A | | | | | |
| MOTEURS LEROY-SOMER 2 BD MARCELLIN LEROY - 16000 ANGOULEME - FRANCE www.leroy-somer.com Made in India by Leroy-Somer | | | | | | | | | |
|  Scan the code or go to www.ecin.nidec.com to check product data | | | | | | | | | |

To prevent the bearings from becoming marked, do not store in an environment with significant vibration.

1.4 - Applications

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

1.5 - Usage restrictions

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

400Hz High Frequency Alternators

2 - TECHNICAL CHARACTERISTICS

2.1 - Electrical characteristics

All standard products have 2/3 pitch main windings to eliminate the third harmonic. This serves to lower operating temperatures, give lower harmonic content and better waveform, and extend the overall life of the alternator.

2.2 - Mechanical characteristics

- Degree of protection: IP23
- Type of mounting: single-bearing IM2005 and two-bearing IM2001
- Other types of protection and mounting can also be offered on request

2.3 - Schematic diagram

- Here the excitation power is derived from the main output winding.

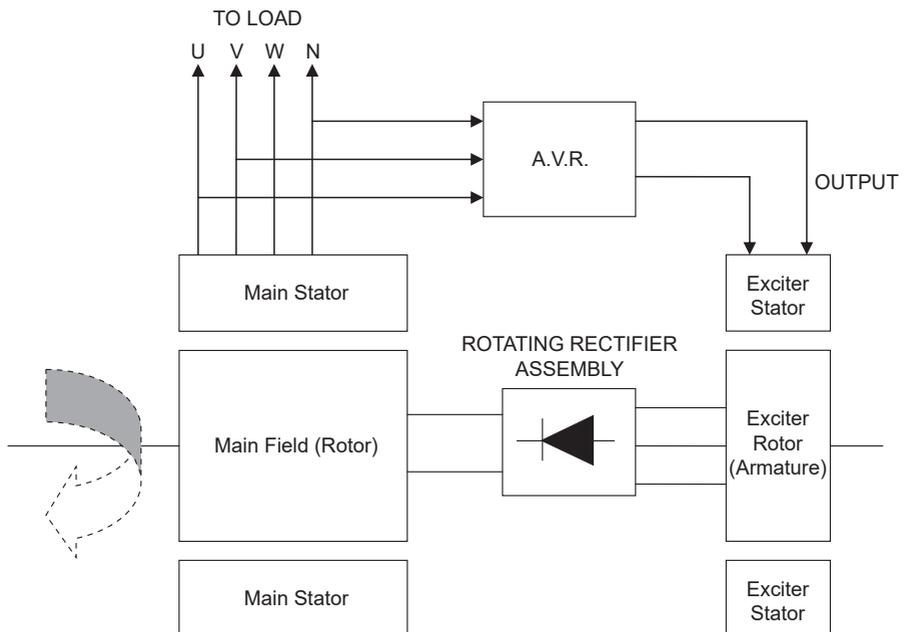
Referring to the schema below, initially the machine builds up voltage with the help of residual magnetism.

- The automatic voltage regulator (AVR) will sense this low voltage and compare it with the set reference voltage level and provides such power as is available from the main stator winding in order to establish the exciter field.

- The power from the main output winding is rectified in the AVR and added to residual voltage level of exciter to produce a greater magnetic field strength. This in turn increases output voltage from the exciter rotor and so on.

- The output from the exciter rotor is rectified by the rotating diodes which adds to the field strength and increase the output voltage from the main stator.

- The AVR senses this increases, compares it with the set reference and uses the increased power from the main stator to further increase the exciter field excitation as required. In this way the main stator voltage is progressively built up until the sensed voltage is the same as the set reference voltage.



400Hz High Frequency Alternators

3 - OPERATING PERFORMANCE

3.1 - Voltage accuracy and response time

The steady state voltage accuracy will be $\pm 0.8\%$ at 0.8 to unity p.f (lag) from no load to full load and this is independent of the temperature, voltage, load and power factor within the limits specified. The voltage regulator will keep the alternator voltage constant without undue overheating of its component and under consideration of speed drop to the extent of 4 % of rated speed. The response time of regulation is less than 75 milliseconds.

3.2 - Voltage adjustment

A potentiometer is provided in the AVR for voltage adjustment up to $\pm 5\%$ of rated voltage. Provision is made for connecting external potentiometer in the AVR for any remote adjustment.

Refer to the AVR manual ref. 5744 for details.

3.3 - Stability adjustment

A potentiometer is provided to reduce the voltage hunting under no-load condition.

Procedure to set STAB pot is as follows: refer to the AVR manual ref. 5744 for details.

3.4 - Overload

The 400Hz alternators are designed to withstand 10 % overload for one hour in every 12 hours of rated load operation and 50% over load for 30 seconds as specified in relevant standards.

3.5 - Short circuit

The alternators are designed to withstand the short circuit current of three times the rated current for three seconds. The exciter is liberally designed to cater to the excitation requirement under such conditions.

4 - AUTOMATIC VOLTAGE REGULATOR

The D550 is a digital automatic voltage regulator (AVR) for alternators with rated field current up to 7 A.

It offers a vast array of regulation modes suitable for all power generation applications, including grid-connected configurations.

The D550 also integrates a visual interface through the EasyReg Advanced software, which allows the user to read the configuration values and parameters. It can also be configured directly via USB without external power supply.

The D550 also includes several protections and functions to keep the alternator running in full safe operation.

The communication port is CANJ1939 compatible.

• Regulation modes:

- Voltage
- Field current (manual mode)
- Generator power factor
- Grid power factor
- Generator kVAR

• Regulation features:

- Voltage equalization
- Droop management
- Cross current compensation
- Soft start
- Load Acceptance Module (L.A.M.) function to assist during heavy load application events
- Negative field forcing

• kW, kVAR, kVA & PF calculation

• Protections & Limitations:

- Under and over field current limitation
- Loss of field sensing
- Generator under/over voltage
- Loss of sensing
- V /Hz regulation mode

400Hz High Frequency Alternators

5 - INSTALLATION AND COMMISSIONING

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

5.1 - Delivery and storage

Upon receipt of the alternator, it is recommended that it should be carefully examined for possible damage in shipment. The alternator was given to the Freight Company in good condition, and they are responsible for the product from our dock to yours. Any damage should be noted on the freight bill before accepting the shipment. Claims for damages must be promptly filed with the Freight Company.

WARNING

The alternator must be stored in a clean and dry place to avoid entry of moisture and the harmful dusts as otherwise the insulation resistance of the windings will get affected. In order to prevent compression pits in the bearings, the alternator should be stored in vibration free premises.

5.2 - Location

- The alternator shall be installed where there is sufficient circulation of fresh-air. i.e. ambient temperature never exceeds 40°C for the normal rating.
- For higher temperature, a deration factor should be applied.
- Further the room must be dry and the machine must be easily accessible.
- Vibration of the alternator should be with in values specified in IEC60034. If vibration is more, then the levels of the alternator feet should be checked with the help of dial indicator and corrected.
- Care should be taken exhaust of diesel engine does not get mixed with the air inlet of the alternator.

5.3 - Foundation

For mounting the alternator with the prime mover, it will be necessary to mount the alternator on a bedplate or base frame but not directly over the cast foundation.

The holes that take up the foundation or anchor bolts must be grouted with concrete of a composition equal to that of the foundation itself.

The nuts of the bolts shall be tightened only after the concrete has properly cured.

5.4 - Installation

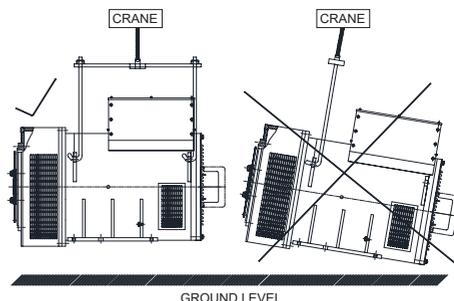
WARNING

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

The machine can only be started up and used if the installation is in accordance with the regulations and instructions defined in this manual.

Make sure that the air inlet and outlet openings are clear without any obstruction.

The alternators are intended for horizontal mounting and direct drive through flexible coupling in case of double bearing machine and with coupling disc in single bearing machine; the tapped holes provided in the shaft end/hub can be used for fitting coupling.



400Hz High Frequency Alternators

5.5 - Alignment

Measuring the concentricity and parallelism of the coupling shall carefully align the alternator and the prime mover.

The difference between the two coupling halves shall not exceed 0.1 mm.

5.6 - Direction of rotation

The alternator can be driven in either direction of rotation. For the standard phase sequence U-V-W, the rotation is clockwise looking from the drive end of the alternator, for anticlockwise rotation; transpose phases V and W to get U-W-V phase sequence.

5.7 - Terminations and switchgear

Standard termination consists of four terminals, three-phase and a neutral. Correct size of cable glands should be chosen. The switchgear should include all those required for the operation of the alternator and the same is not in the scope of supply of alternator manufacturer as such. Adequate protection system has to be provided to protect and to isolate the alternator during any malfunction.

For the optimum performance, the current in the three lines should be equal. However unbalance of up to 25% may be allowed for short period without exceeding the rated current. Voltage regulation and other performance characteristics are not guaranteed for unbalance and non-linear loads.

6 - ASSEMBLY OF ALTERNATOR TO PRIME MOVER

6.1 - Foundation

The machine should be mounted on a foundation / base frame, which may be of steel structure or concrete platform.

The foundation / base frame must be well designed for adequate rigidity and long life, taking into consideration the dynamic loading under abnormal running of the machine, vibration resulting from running machinery and other relevant factors.

Care must be taken to ensure that the surface to which the machine is bolted down is aligned and leveled in all directions prior to mounting the machine.

6.2 - Alternator mounting single bearing

Single bearing alternators are provided with an SAE flywheel adapter and flexible drive/discs. Very close tolerances are maintained in the manufacture of the alternator so that the alignment procedure is extremely simple. A coupling hub is shrunk on the shaft and special steel drive discs are bolted to the hub. Holes are provided in the periphery of the coupling disc, which correspond to tapped holes in the flywheel. The outside diameter of the discs fits in a rabbet in the flywheel so that concentricity is ensured in all cases. Ensure endplay available.

The SAE adapter and the flywheel housing are designed to match each other with no further alignment necessary. Shims may be necessary under the feet of the alternator to ensure a solid mounting.

WARNING

When coupling the alternator to the prime mover, do not use the fan to turn the alternator or rotor.

The holes of the coupling discs should be aligned with the flywheel holes by cranking the engine.

Make sure the machine is securely bedded in position during coupling.

6.3 - Alternator mounting double bearing

Two bearing alternators are provided with a shaft extension and key way. For direct coupled sets the assembler furnishes a flexible coupling which is installed between the driver and the alternator shaft.

WARNING

Aligning the two machines as accurately as possible will reduce vibration, increase-bearing life, and ensures minimum coupling wear. It may be necessary to shim the alternator feet for proper support and alignment.

Consult us for alignment specifications and procedures.

400Hz High Frequency Alternators

7 - ELECTRICAL CHECKS

WARNING

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

7.1 - Insulation checks

If the machine is stored for long period or is suspected to be damp, the insulation resistance of the winding should be checked. While checking the insulation resistance of the winding it must be ensured that all the connections to the AVR and rotating rectifier assembly are removed.

The insulation resistances of all windings are to be checked using a 500V megger before the alternator is put into operation. The insulation resistance of the winding and earth should be greater than 2 Mega ohm. If the resistance is less than this value, connect 230V, single phase supply to space heater terminals provided inside the terminal box for 1 or 2 hours. Again recheck for IR value.

Alternative methods to improve IR Value are as follows:

- Disconnect the AVR from the terminals, short circuit the three stator output terminals through a cable capable of carrying the rated current and also provide an ammeter to monitor the current flowing in the short circuit terminals. Connect a 24V battery to the field winding (F1 & F2) terminals of the exciter stator with respect to the polarities in series with a rheostat of about 10 ohms and 250W.

- Run the alternator to its rated speed and adjust its excitation through the rheostat in order to obtain the rated current in the short-circuited terminals. After getting heated up stop the prime mover, disconnect the exciter field connection from the 24 V battery and again measure the insulation resistance value.

Another method of improving IR value of winding is to circulate the hot air through the machine.

Placing heaters inside or near the machine may do it. Care should be taken to see that temperature of no part of the winding exceeds 90°C (194°F) total temperature by thermometer.

7.2 - Connection checks

Most of the problems that arise during operation are due to wrong, loose or snapped connections from AVR/switchgear to the machine. Hence, it is important to check these connections thoroughly.

The connection between AVR and the alternator terminal should be checked as per the connection diagram.



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.

WARNING

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.

400Hz High Frequency Alternators

- 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% | | | |

Important points for all reconnection operations:

- Use polyamide plastic clamps 105°C minimum, 550 N minimum.
- Group the cables: three maximum.
- Do not cross cables if possible.
- Leave enough space to allow cooling.



7.3 - 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.

7.4 - Residual voltage checks

The minimum residual voltage at the alternator terminals required for positive buildup is about 2.5V between line to neutral with the alternator running at rated speed.

If the machine does not build up due to low or loss of residual magnetism, the following procedure is applied to recharge the alternator:

- Stop the engine and disconnect the AVR connections.
- Flash the exciter field by connecting 12/24V battery with F1 connected to positive and F2 to negative terminal of the battery for 10 - 15 seconds.

Failures to build up voltage (see section 8.5).



Do not megger or flash test the alternator windings unless all leads to the AVR have been disconnected.

7.5 - Rated voltage and balanced voltage checks

The alternator is started and run at its rated speed. Whenever manual control of voltage is provided as a feature, the alternator should be excited on no load manually, till the rated voltage is developed between line to line. The voltage balance on the three lines of the alternator should be checked.

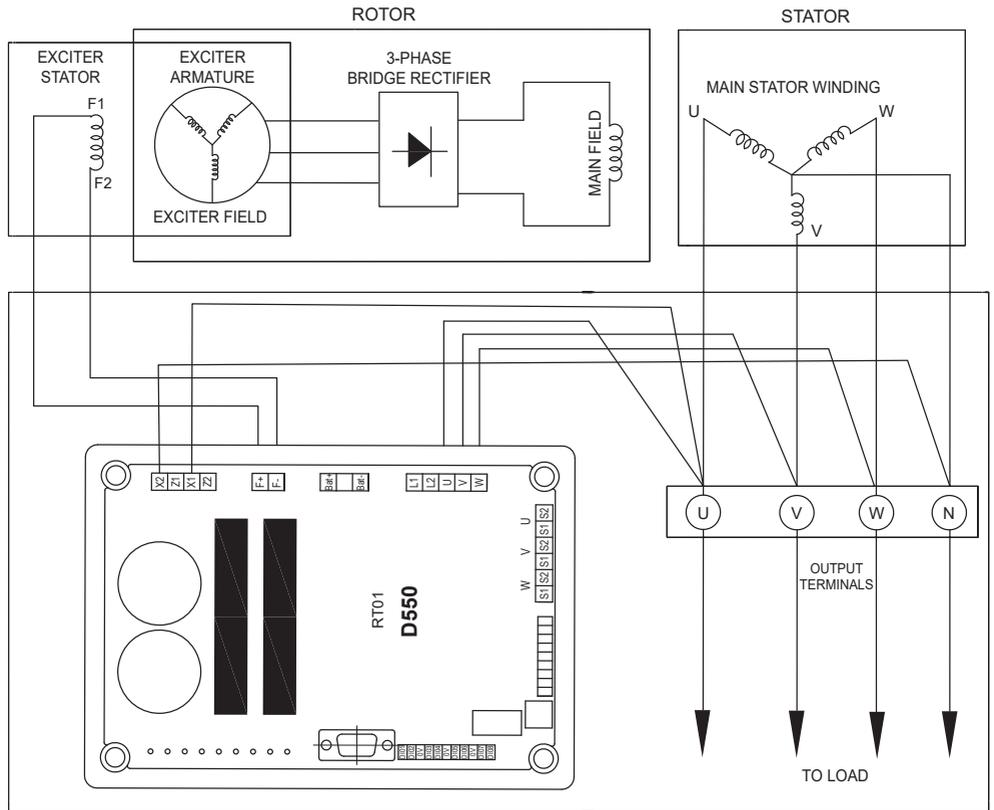


Do not start the alternator with load on. Removal of pot sealing in AVR warranty void.

400Hz High Frequency Alternators

7.6 - Connection diagram with D550 digital AVR

• SHUNT three-phase



400Hz High Frequency Alternators

8 - SERVICING - MAINTENANCE

8.1 - 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.

8.2 - Routine maintenance

• Checks after start-up

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

• Electrical servicing

Commercially-available volatile degreasing agents can be used.

WARNING

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

These operations must be performed at a cleaning station, equipped with a vacuum system that collects and flushes out the products used.

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

• Mechanical servicing

WARNING

Cleaning the machine using water or a highpressure washer is strictly prohibited. Any problems arising from such treatment are not covered by our warranty.

Degreasing: use a brush and detergent (suitable for paintwork).

Dusting: use an air gun.

If the machine is fitted with air inlet and outlet filters, the maintenance personnel should clean them routinely at regular intervals. In the case of dry dust, the filter can be cleaned using compressed air and/or replaced if it is clogged.

After cleaning the alternator, it is essential to check the winding insulation (see section 8.5).

400Hz High Frequency Alternators

8.3 - Bearings

Permanently greased bearings

Bearings life (depending on use): 20,000 hours
or 3 years (grease life)



Monitor the temperature rise in the bearings, which should not exceed 90°C above the ambient temperature. Should this value be exceeded, the alternator must be stopped and checks carried out.

8.4 - Mechanical faults

| Fault | Cause | Rectification |
|-------------------------------|---|--|
| Over heating of alternator | Alternator overload | Check the load and correct. To be in line with nameplate rating |
| | Blocking of ventilation passage | Check ventilation and clean passage if necessary |
| | Low speed on load | Adjust prime mover speed |
| | Low load power factor | Reduce the load |
| | Alternator operating at very high voltage | Check voltage and adjust |
| | High percentage of nonlinear load | Check and reduce nonlinear load |
| Excessive vibration and noise | Poor alignment | Realign properly |
| | Coupling and foundation bolts loose | Tighten the bolts |
| | Bearing defective | Replace bearings |
| Over heating of bearing | Incorrect assembly of bearing | Reassemble correctly |
| | Bearing damaged | Replace bearing |

400Hz High Frequency Alternators

8.5 - Electrical faults

| Fault | Cause | Rectification | |
|--|--|---|--|
| No voltage from alternator | Defective voltmeter | Check voltmeter and replace | |
| | Excitation circuit open | Check for loose connection | |
| | Incorrect excitation circuit connection | Check for proper connection | |
| | Low residual voltage | | Check for residual voltage. If residual voltage is less than 2.5 volts (L N), field flashing required for few seconds |
| | | | Field flashing procedure: - Disconnect regulator connections - Connect 12/24V battery keeping F1 to positive and F2 to negative terminal of exciter stator |
| | Grounded exciter field | Check and correct | |
| | Rotating rectifier faulty | Check rotating diodes | |
| | Fuses in AVR failed | Replace fuses | |
| AVR defective | Replace AVR | | |
| Voltage developed but excitation current is high | Rotating diode faulty | Check rotating diodes and replace faulty diodes | |
| | Prime mover | Adjust prime mover | |
| | Prime mover speed is low | Adjust prime mover speed to rated speed | |
| Low voltage build up | V Trim Pot incorrectly set | Adjust voltage by V Trim Pot in AVR | |
| | Low prime mover speed | Adjust prime mover speed to rated speed | |
| Voltage - High | Loose or no connection to U terminals of the AVR | Check and correct | |
| | Incorrect voltage setting | Adjust voltage by V Trim Pot in AVR | |
| | AVR defective | Replace AVR | |
| Voltage fluctuation | Speed fluctuation of the prime mover | Set the speed of the prime mover | |
| | Incorrect setting of stability Pot | Adjust stability Pot in AVR | |
| | Leading load power factor | Correct the power factor | |
| | Load hunting, fluctuates rapidly | Check and reduce the non linear load | |
| | High percentage of non linear load | Rectification | |

400Hz High Frequency Alternators

• Checking the winding

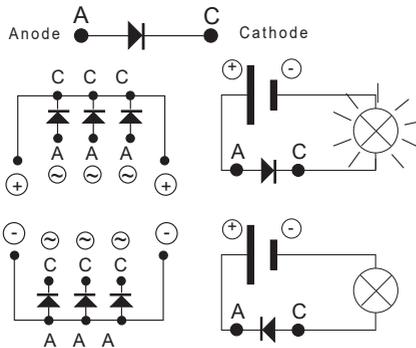
You can check the winding insulation by performing a high voltage test. In this case, you must disconnect all AVR wires.

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.



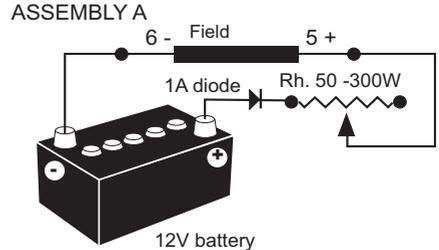
• Checking the windings and rotating diodes using separate excitation



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-).

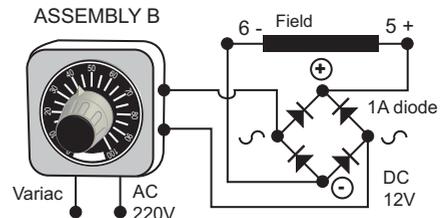


Assembly B: Connect a "Variac" variable power supply and a diode bridge on both exciter field wires (5+) and (6-).

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 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 (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).



400Hz High Frequency Alternators

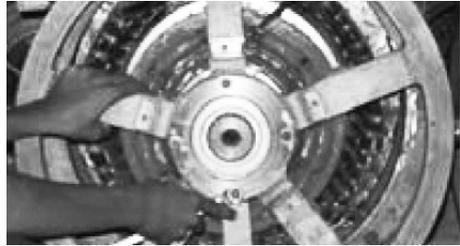
8.6 - Dismantling and assembly

WARNING

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 (rotor not locked in position). Check how much the machine weighs before choosing the lifting method.

• Rotor removal

- Remove NDE front cover.
- Remove the screws of NDE bearing cap.
- Disconnect exciter stator winding leads from AVR.
- Unbolt the NDE end shield from the stator body and jack the NDE end shield with the help of suitable bolts.
- Take out the rotor towards the DE side along with the fan and bearing from the stator body.
- Reassemble the rotor in reverse order.



NDE end shield removal

• Rotating rectifier assembly removal

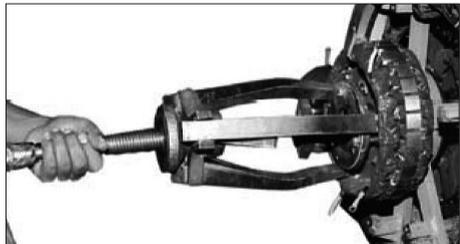
- Disconnect the rotating rectifier assembly connections from main rotor and exciter rotor.
- Unbolt the rotating rectifier assembly from the exciter rotor with the help of suitable spanners.
- Withdraw the rotating rectifier assembly towards the NDE side.
- Refit the rotating rectifier assembly on exciter rotor in reverse order.



Rotating rectifier assembly removal

• Exciter rotor removal

- Remove bearing from the shaft using suitable bearing puller.
- Remove rotating rectifier assembly from the exciter rotor.
- Fix suitable fixture to studs provided in exciter rotor.
- Pull out the exciter rotor from the shaft with suitable puller towards the NDE side.



Bearing removal

• Exciter stator removal

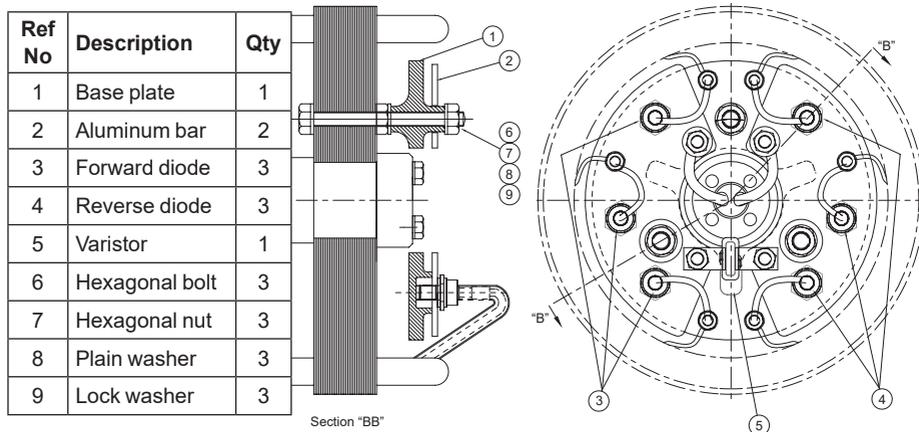
- Disconnect the exciter stator winding leads from AVR.
- Unbolt the NDE shield from the stator body.
- Unbolt the exciter stator core from NDE shield.
- Refit the exciter stator in reverse order.



Exciter rotor removal

400Hz High Frequency Alternators

8.7 - Rotating rectifier assembly



8.8 - Table of characteristics

Alternator: 16/24/26 poles - 400 Hz. The voltage and current values are given for no-load operation and operation at rated load with separate field excitation. All values are given to within $\pm 10\%$ and may be changed without prior notification (for exact values, consult the test report).

• Average values for the LSA 180/225/280

Resistances at 20 °C (Ω), field excitation current & weights of the machine

| Type | L/L stator | Rotor | Excitation | | Weight in kg | |
|-----------|------------|-------|------------|---------------|--------------|-----|
| | | | No load | At rated load | SB | DB |
| LSA 180 A | 0.1150 | 1.898 | 0.8 | 3.5 | 117 | 128 |
| LSA 180 B | 0.1150 | 1.898 | 0.8 | 3.7 | 117 | 128 |
| LSA 180 C | 0.1146 | 1.897 | 0.9 | 3.7 | 117 | 128 |
| LSA 180 D | 0.0408 | 2.883 | 0.9 | 3.8 | 137 | 148 |
| LSA 180 E | 0.0408 | 2.883 | 0.8 | 3.8 | 151 | 162 |
| LSA 180 F | 0.0408 | 2.883 | 0.9 | 3.9 | 165 | 176 |
| LSA 180 G | 0.0274 | 3.727 | 0.8 | 4.0 | 185 | 196 |
| LSA 180 H | 0.0274 | 3.730 | 0.8 | 4.2 | 185 | 196 |
| LSA 180 I | 0.0176 | 4.571 | 0.9 | 4.3 | 200 | 211 |
| LSA 180 J | 0.0176 | 4.571 | 1.0 | 4.5 | 214 | 225 |
| LSA 225 A | 0.1250 | 4.480 | 0.9 | 4.0 | 290 | 315 |
| LSA 225 B | 0.0736 | 5.460 | 0.9 | 4.2 | 310 | 335 |
| LSA 225 C | 0.0432 | 6.630 | 0.9 | 4.0 | 330 | 355 |
| LSA 280 A | 0.0230 | 2.700 | 0.9 | 4.2 | 570 | 600 |
| LSA 280 B | 0.0199 | 2.930 | 0.9 | 4.4 | 725 | 755 |
| LSA 280 C | 0.0168 | 3.160 | 0.9 | 4.7 | 740 | 770 |
| LSA 280 D | 0.0138 | 3.400 | 1.0 | 4.6 | 780 | 810 |
| LSA 280 E | 0.0107 | 3.620 | 0.9 | 4.8 | 810 | 840 |
| LSA 280 F | 0.0076 | 3.849 | 1.0 | 4.8 | 850 | 880 |

400Hz High Frequency Alternators

9 - SPARE PARTS

9.1 - Recommended spares



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

| Description | Qty | Code |
|-----------------------------------|-------|------------------------------|
| Automatic voltage regulator (AVR) | 1 | ALT550KC001B |
| Bearing NDE | 1 | BG1100631010 BG1100631210 |
| Rotating rectifier assembly (RRA) | 1 set | ESC035MD004B 1RRBF0700200 |
| Wound exciter rotor | 1 | 1ERLB0400100 1ERLB0500200 |
| Wound exciter stator | 1 | 1ESLB0400600 1ESLC0500200 |
| Terminal bar | 1 | AG3030570000 AG3040790000 |

9.2 - Technical support service

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

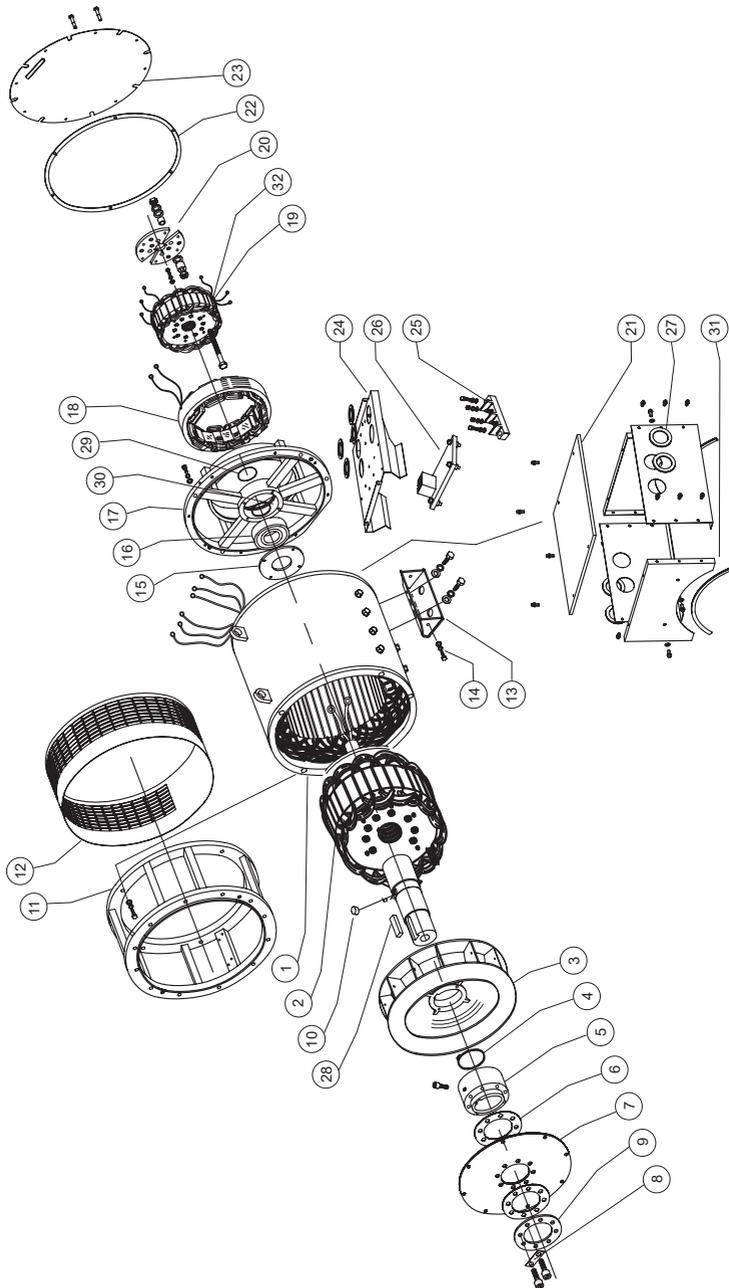
For all spare parts orders or technical support requests, send your request to service.epg@leroy-somer.com or your nearest contact, whom you will find at www.lrsom.co/support indicating the complete type of machine, its number and the information indicated on the nameplate.

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

400Hz High Frequency Alternators

9.3 - Exploded view, parts list and tightening torque



400Hz High Frequency Alternators

| Ref. | Qty | Description | 180 frame | | 225 frame | | 280 frame | |
|------|-----|-----------------------------|------------|---------------|------------|---------------|------------|---------------|
| | | | Screw Ø | Torque N.m | Screw Ø | Torque N.m | Screw Ø | Torque N.m |
| 1 | 1 | Stator assembly | - | - | - | - | - | - |
| 2 | 1 | Rotor assembly | - | - | - | - | - | - |
| 3 | 1 | Fan with key | - | - | - | - | - | - |
| 4 | 1 | Circlip for fan | - | - | - | - | - | - |
| 5 | 1 | Hub with key | - | - | - | - | - | - |
| 6 | 6 | Shim | - | - | - | - | - | - |
| 7 | 3 | Disc coupling | M10 | 50 | M12 | 90 | M12 | 90 |
| 8 | 3 | Locking washer | - | - | - | - | - | - |
| 9 | 1 | Pressure plate | - | - | - | - | - | - |
| 10 | 1 | Fan key | - | - | - | - | - | - |
| 11 | 1 | DE adaptor SAE-3 | M10 | 50 | M10 | 50 | M12 | 50 |
| 12 | 1 | DE slotted surround SAE-3 | M6 | 10 | M6 | 10 | M6 | 10 |
| 13 | 2 | Feet | - | - | - | - | - | - |
| 14 | 1 | Earthing bolt | M10 | 50 | M10 | 50 | M10 | 50 |
| 15 | 1 | Bearing cap | M6 | 10 | M6 | 10 | M6 | 10 |
| 16 | 1 | Bearing | - | - | - | - | - | - |
| 17 | 1 | NDE shield | M10 | 50 | M10 | 50 | M10 | 50 |
| 18 | 1 | Exciter stator | M8 | 25 | M8 | 25 | M8 | 25 |
| 19 | 1 | Exciter rotor | - | - | - | - | - | - |
| 20 | 1 | Diode | M6 | 10 | M6 | 10 | M6 | 10 |
| 21 | 1 | Terminal box top cover | M6 | 10 | M6 | 10 | M6 | 10 |
| 22 | 1 | Gasket | - | - | - | - | - | - |
| 23 | 1 | NDE front cover | M8 | 25 | M8 | 25 | M8 | 25 |
| 24 | 1 | Platform | - | - | - | - | - | - |
| 25 | 1 | Terminal bar | M8 | 10 | M10 | 26 | M12 | 46 |
| 26 | 1 | AVR | M6 | 10 | M6 | 10 | M6 | 10 |
| 27 | 4 | Grommet | - | - | - | - | - | - |
| 28 | 1 | Extension key | - | - | - | - | - | - |
| 29 | 1 | O-ring | - | - | - | - | - | - |
| 30 | 1 | Exciter rotor locking plate | - | - | - | - | - | - |
| 31 | 2 | Terminal box with gasket | M6 | 10 | M6 | 10 | M6 | 10 |
| 32 | 1 | Varistor | M6 | 10 | M6 | 10 | M6 | 10 |

400Hz High Frequency Alternators

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.

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 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.

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

Our alternators have a specified lifetime of 20 years. After this period, the operation of the product should be stopped, regardless of its condition. Any further operation after this period will be under the sole responsibility of the user.

400Hz High Frequency Alternators

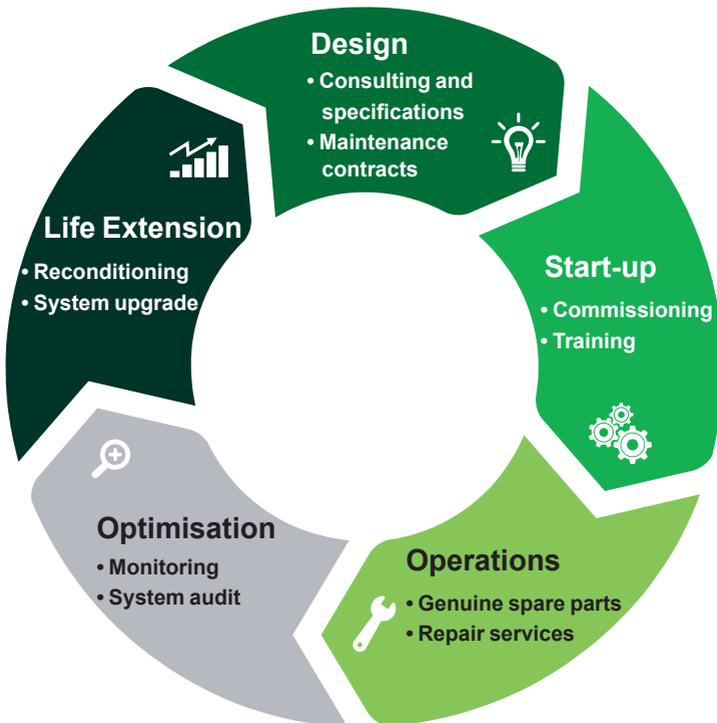
Service & Support

Our worldwide service network of over 80 facilities is at your service. Our local presence is your 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 alternators operations, providing the best value service to optimize your cost of ownership.

How can we help:



Contact us:

Americas: +1 (507) 625 4011

EMEA: +33 238 609 908

Asia Pacific: +65 6250 8488

China: +86 591 8837 3010

India: +91 806 726 4867

 service.epg@leroy-somer.com



Scan the code or go to:
www.lrsn.co/support



www.nidecpower.com

Connect with us at:

