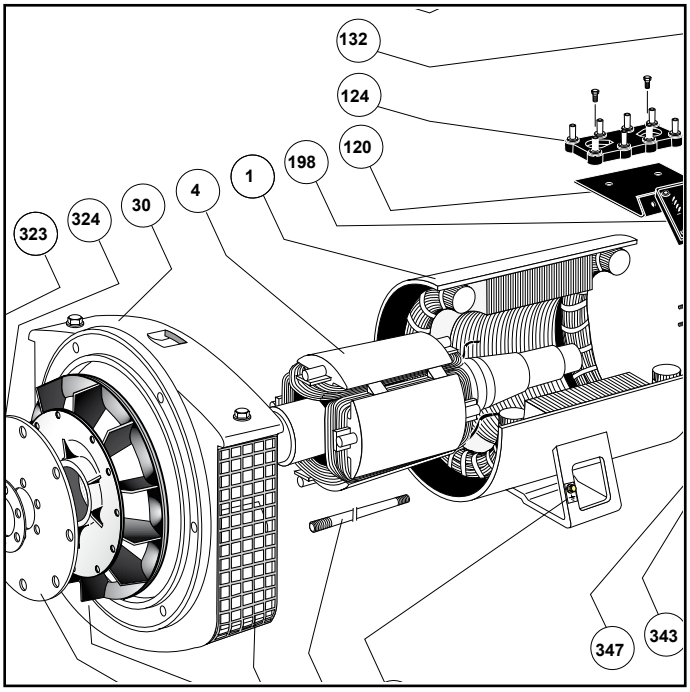
LEROY SOMER®

3433 en - 2010.10 / g

This manual must be supplied to the end user



LSA 42.2 - 2 & 4 POLE

ALTERNATORS

Installation and maintenance

LSA 42.2 - 2 & 4 POLE

ALTERNATORS

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

SAFETY MEASURES

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

All necessary operations and interventions on this alternator 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 alternator or surrounding equipment.

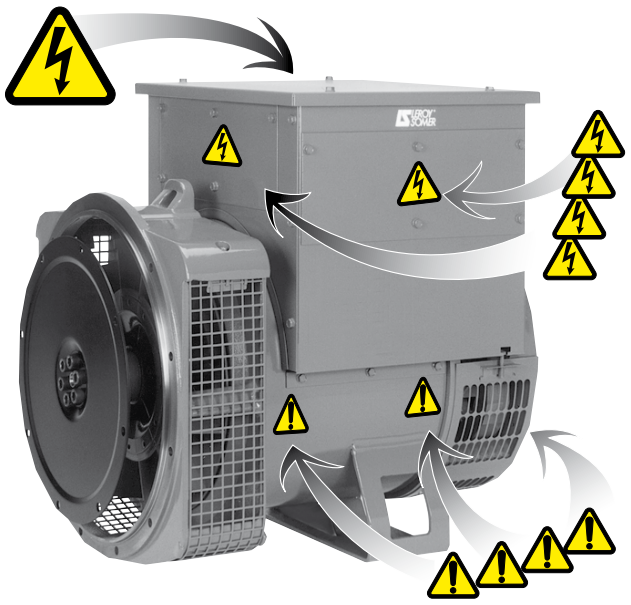
Warning symbol for general danger to personnel.

Warning symbol for electrical danger to personnel.

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

WARNING SYMBOLS

We would like to draw your attention to the following two safety measures that 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 alternator 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 Directives EC and plus any other directives that may be applicable.

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ALTERNATORS

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ALTERNATORS

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 able to claim on their insurance) and after a visual check, turn the machine by hand to detect any malfunction.

1.3 - Identification

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

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

The generator name is defined according to various criteria (see below).

Example of description for : **LSA 42.2 S4 J6/4 -**

- LSA : name used in the PARTNER range
  M : Marine / C : Cogeneration / T : Telecommunications.
- 42.2 : machine type
- S4 : model
- J : field excitation system
  (C:AREP / J:SHUNT / E:COMPOUND)
- 6/4 : winding number / number of poles.

1.3.1 - Nameplate

So that you can identify your alternator quickly and accurately, we suggest you fill in its specifications on the nameplate below (the Information on this is not contractually binding).

1.4 - Storage

Prior to commissioning, alternators should be stored :

- Away from humidity : in conditions of relative humidity of more than 90%, the alternator 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 alternator can be placed in a sealed enclosure (heatshrunk plastic for example) with dehydrating sachets inside, away from significant and frequent variations in temperature to avoid the risk of condensation during storage.

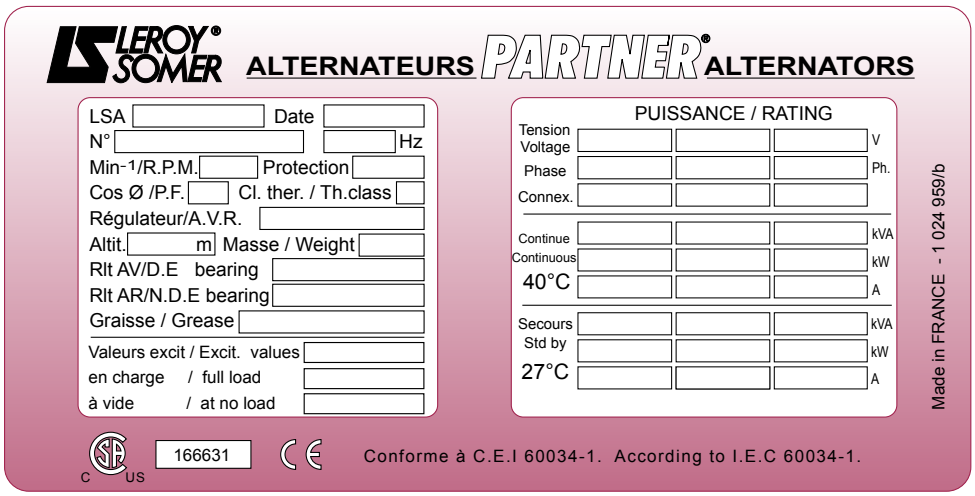
- If the area is affected by vibration, try to reduce the effect of these vibrations by placing the generator on a damper support (rubber disc or similar) and turn the rotor a fraction of a turn once a fortnight to avoid marking the bearing rings.

1.5 - Applications

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

1.6 - Contraindications to use

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



LSA 42.2 - 2 & 4 POLE

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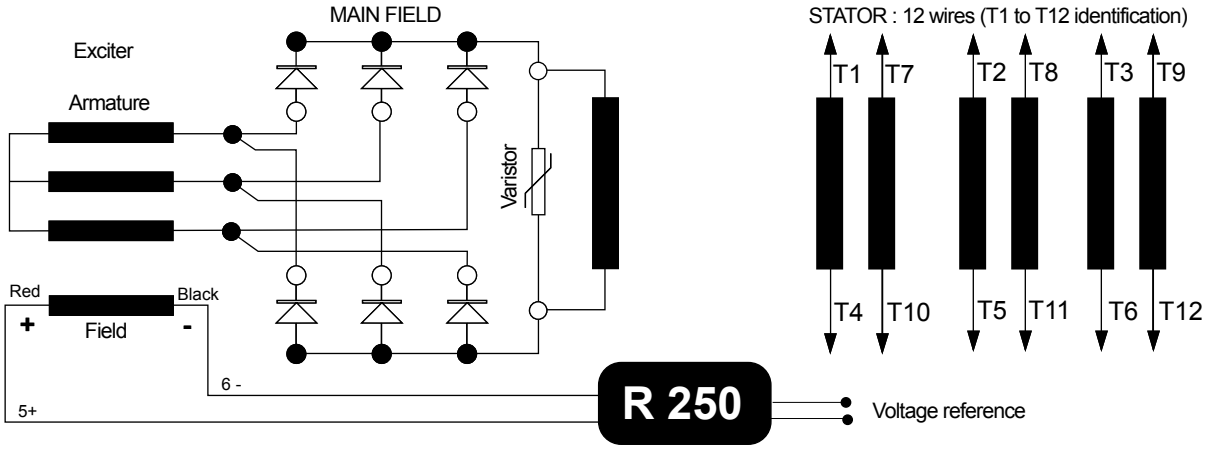
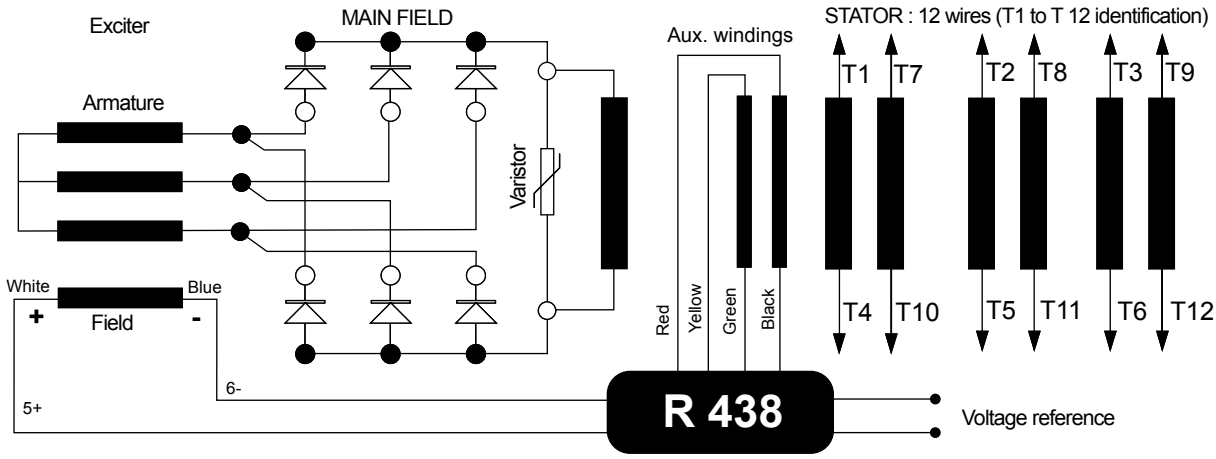
2 - TECHNICAL CHARACTERISTICS

2.1 - Electrical characteristics

The PARTNER LSA 42.2 alternator is generator without sliprings and revolving field brushes, wound as “2/3 pitch”; 12-wire, with class H insulation and a field excitation system available in either “SHUNT” or “AREP” version (see sections 2.3, 2.4). Interference suppression conforms with standard EN 55011, group 1, class B.





2.1.1 - Options

- Stator temperature detection probes.
- Space heaters.

2.2 - Mechanical characteristics

- Steel frame
- End shields in cast iron
- Mounting arrangement

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

2.2.1 - Options

- Protection against harsh environmentsh.
- Air input filter, air output labyrinth cowling.

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

3 - INSTALLATION

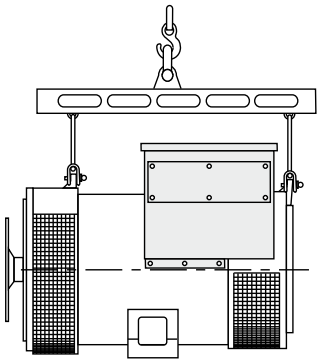
Personnel undertaking the various operations discussed in this section must wear the appropriate personal protective equipment for mechanical and electrical hazards.

3.1 - Assembly

All mechanical handling operations must be undertaken using approved equipment and the alternator must be horizontal. Check how much the alternator weighs (see 4.7.6) before choosing the lifting tool. During this operation, do not allow anyone to stand under the load.

3.1.1 - Handling

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



3.1.2 - Coupling

3.1.2.1 - Single bearing alternator

Before coupling the alternator and the heat engine, check they are compatible by:

- Undertaking a torsional analysis of the transmission.

-Checking the dimensions of the flywheel and its housing, the flange, coupling discs and offset.

WARNING

When coupling the alternator to the prime mover, the holes of the coupling discs should be aligned with the flywheel holes by rotating the engine flywheel. Do not use the fan to turn the alternator rotor. Make sure the alternator is securely bedded in position during coupling.

Tighten the coupling discs screws to the recommended torque (see section 4.6.2.) and check that there is lateral play on the crankshaft.

3.1.2.2 - Two-bearing alternator

- Semi-flexible coupling

Careful alignment of the alternator and the heat engine is recommended, checking that the differences in concentricity and parallelism of the two parts of the coupling do not exceed 0.1 mm.

WARNING

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

3.1.3 - Location

Ensure that the ambient temperature in the room where the alternator is placed cannot exceed 40°C for standard power ratings (for temperatures above 40°C, apply a derating coefficient). Fresh air, free from damp and dust, must be able to circulate freely around the air input louvres on the opposite side from the coupling. It is essential to prevent not only the recycling of hot air from the machine or engine, but also exhaust fumes.

3.2 - Inspection prior to first use

3.2.1 - Electrical checks

Under no circumstances should an alternator, new or otherwise, be operated if the isolation is less than 1 megohm for the stator and 100,000 ohms for the other windings.

There are two possible methods for restoring the above minimum values.

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

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

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

- Short-circuit the output phases using connections capable of supporting the rated current (try not to exceed 6 A/mm2).
- Insert a clamp ammeter to monitor the current passing through the short-circuit connections.
- Connect a 48 Volt battery in series with a rheostat of approximately 10 ohms (50 Watts), to the exciter field terminals, respecting the polarity.
- Open fully all the alternator orifices.
- Run the alternator at rated speed . Adjust the exciter field current using the rheostat to obtain the rated output current in the short-circuit connections.

Note: Prolonged standstill: In order to avoid these problems, we recommend the use of space heaters, as well as turning over the alternator from time to time. Space heaters are only really effective if they are working continuously while the alternator is stopped.

WARNING

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

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3.2.2 - Physical and visual checks

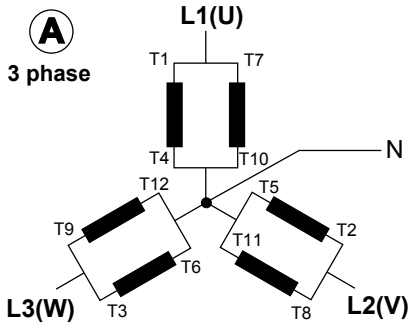
Before starting the machine for the first time, check that:
- the fixing bolts on the feet are tight
- the cooling air is drawn in freely
- the protective louvres and housing are correctly in place
- the standard direction of rotation is clockwise as seen from the shaft end (phase rotation in order 1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

3.3 - Terminal connection diagrams

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

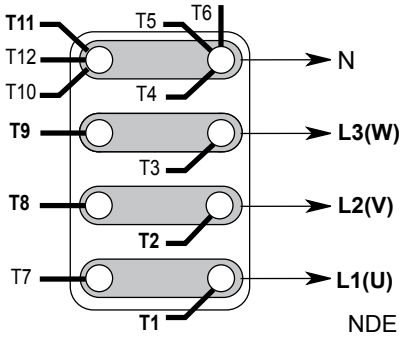
Any intervention on the alternator terminals during reconnection or checks should be performed with the machine stopped.

Connection code A — 3 phase

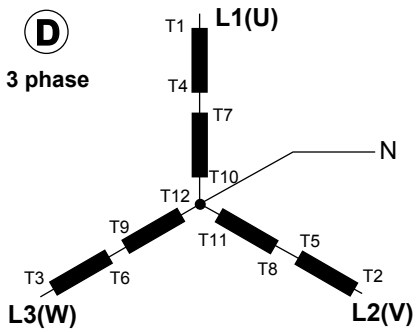


Winding	50 Hz	60 Hz
6	190 - 208	190 - 240
7	220 - 230	-
8	-	190 - 208

R 250 voltage detection :
0 => (T8) / 110 V => (T11)
R 438 voltage detection :
0 => (T3) / 220 V => (T2)

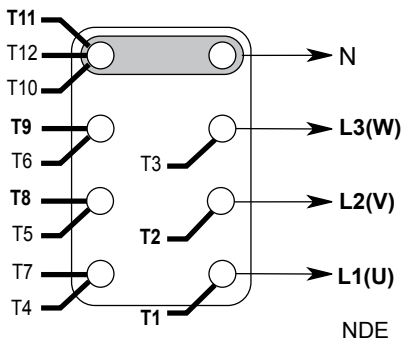


Connection code D — 3 phase

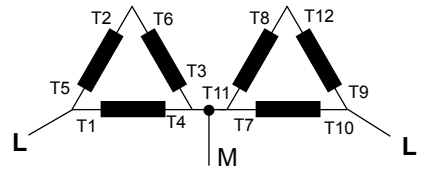


Winding	50 Hz	60 Hz
6	380 - 415	380 - 480
7	440 - 460	-
8	-	380 - 416

R 250 voltage detection :
0 => (T8) / 110 V => (T11)
R 438 voltage detection :
0 => (T3) / 380 V => (T2)



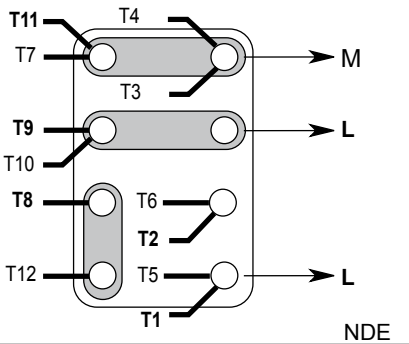
Connection code FF — 1 phase



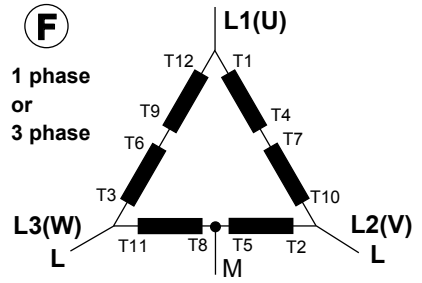
Voltage LM = 1/2 voltage LL

Winding	50 Hz	60 Hz
6	220 - 240	220 - 240
7	250 - 260	-
8	200	220 - 240

R 250 voltage detection :
0 => (T1) / 110 V => (T4)
R 438 voltage detection :
0 => (T10) / 220 V => (T1)



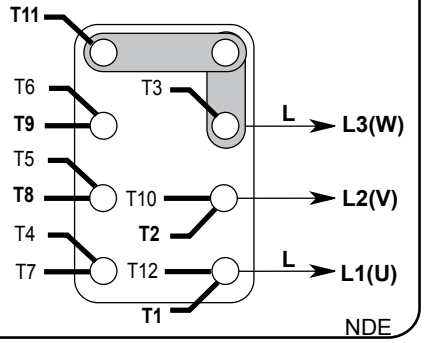
Connection code F — 1 phase or 3 phase



Voltage LM = 1/2 voltage LL

Winding	50 Hz	60 Hz
6	220 - 240	220 - 240
7	250 - 260	-
8	200	220 - 240

R 250 voltage detection :
0 => (T8) / 110 V => (T11)
R 438 voltage detection :
0 => (T3) / 220 V => (T2)



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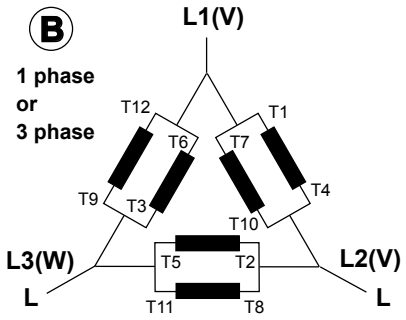
Connection codes

B

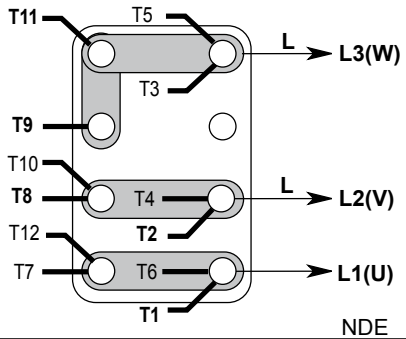


L.L voltage

Winding	50 Hz	60 Hz
6	110 - 120	120
7	120 - 130	-
8	-	110 - 120

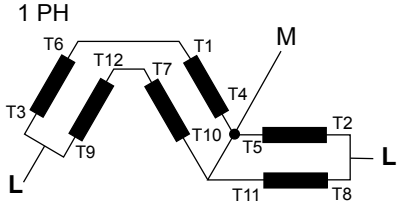
R 250 voltage detection :
0 => (T8) / 110 V => (T11)
R 438 voltage detection :
0 => (T3) / 110 V => (T2)

Factory connection



G Connection not recommended

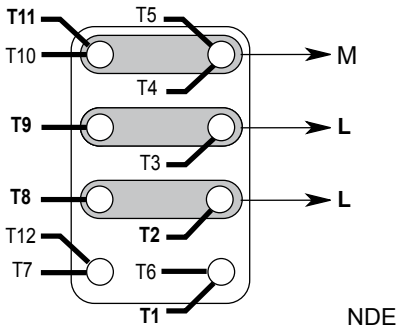
1 PH



LM voltage = 1/2 LL voltage

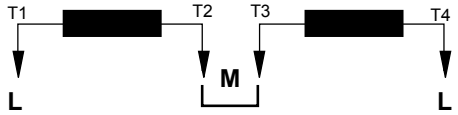
Winding	50 Hz	60 Hz
6	220 - 240	220 - 240
7	250 - 260	-
8	200	220 - 240

R 250 voltage detection :
0 => (T8) / 110 V => (T11)
R 438 voltage detection :
0 => (T3) / 220 V => (T2)



SINGLE PHASE 4 LEADS - WINDING DEDICATED type M or M1

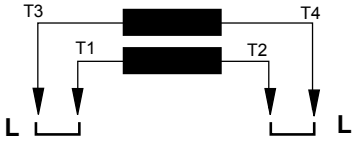
SERIES CONNECTION



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

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

PARALLEL CONNECTION

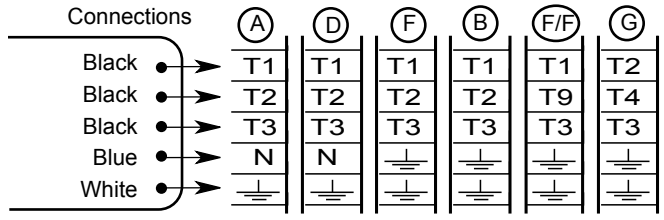


Voltage 50/60 Hz			Output		
L - L	L - M	Connect	L	L	M
110 115 120	- - -	T1 - T3 T2 - T4	T1-T3	T2 - T4	-

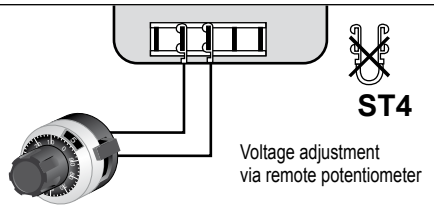
R 250 voltage detection : 0 => (T1) / 110 V => (T2)

3.3.1 - Connection diagram for options

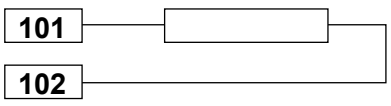
R 791 T interference suppression kit (standard for CE marking)



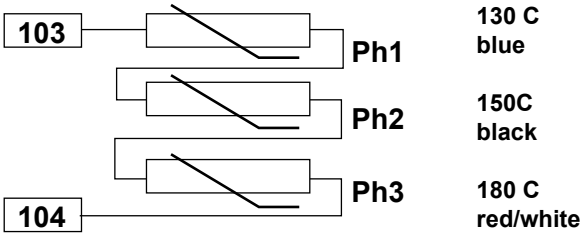
Voltage potentiometer



Anti condensation heater



Thermistor (PTC) temperature



3.3.2 - Connection checks

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

Check that:

- the differential circuit-breaker conforms to legislation on protection of personnel, in force in the country of use, and has been correctly installed on the alternator power output as close as possible to the alternator. (In this case, disconnect the blue wire of the R 791 interference suppression module linking the neutral and protect the terminal).

- any protective devices in place have not tripped,

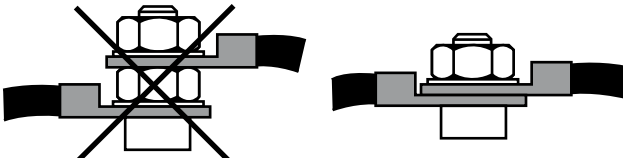
- if there is an external regulator, the connections between the alternator and the cubicle are made in accordance with the connection diagram,

- there is no short-circuit between phase or phase-neutral between the alternator output terminals and the generator set control cabinet (part of the circuit not protected by circuit-breakers or cubicle relays),

- The earth terminal (ref 28) is connected to the electrical earth circuit,

- the alternator should be connected with the terminal lugs on top of one another as shown in the terminal connection diagrams,

- the equipotential earth links have been implemented correctly (cross-section and continuity of the earths).



3.4 - Commissioning

The alternator can only be started up and used if the installation is in accordance with the regulations and instructions defined in this manual.
The alternator is tested and set at the factory. When first used with no load, make sure that the drive speed is correct and stable (see the nameplate). On application of the load, the alternator should achieve its rated speed and voltage; however, in the event of abnormal operation, the alternator setting can be altered (follow the adjustment procedure in section 3.5).

If the alternator still operates incorrectly, the cause of the malfunction must be located (see section 4.4).

3.5 - Setting up

The various adjustments during tests must be made by a qualified engineer. The screwdriver for making adjustments must be suitable for use with electrical equipment. It is essential that the drive speed specified on the genset nameplate is reached before commencing adjustment. The AVR is used to make any adjustments to the alternator. Access to the AVR adjustments is via the panel provided for this purpose.
After operational testing, replace all access panels or covers.

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 alternator 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 the appropriate personal protective equipment for mechanical and electrical hazards.
Before carrying out any work on the alternator, ensure that it cannot be started by a manual or automatic system by isolating the power in any cabinet or enclosure and make sure you have understood the operating principles of the system.

4.2 - Regular maintenance

4.2.1 - Checks after start-up

After approximately 20 hours of operation, check that all fixing screws on the machine are still tight, plus the general state of the alternator 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 guards: mud, fibre, soot, etc. and to check whether the air outlet guards are corroded or scratched.

4.2.3 - Bearings

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

4.2.4 - Electrical servicing

Cleaning product for the windings

WARNING

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

Certain strictly defined pure volatile degreasing products can be used, such as :
- Normal petrol (without additives) ; inflammable
- Toluene (slightly toxic); inflammable
- Benzene (or benzine, toxic); inflammable
- Ciclohexare (non toxic); inflammable

The insulating components and the impregnation system are not at risk of damage from solvents (see the list of authorised products).
Avoid letting the cleaning product run into the slots. Apply the product with a brush, sponging frequently to avoid accumulation in the housing. Dry the winding with a dry cloth. Let any traces evaporate before reassembling the alternator.

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

4.2.5 - Mechanical servicing

WARNING

Cleaning the alternator using water or a high-pressure washer is strictly prohibited.
Any problems arising from such treatment are not covered by our warranty.
The alternator should be cleaned with a degreasing agent, applied using a brush. Check that the degreasing agent will not affect the paint.
Compressed air should used to remove any dust.
If filters have been added to the alternator after manufacture and do not have thermal protection, the service personnel should clean the air filters periodically and systematically, as often as necessary (every day in very dusty atmospheres).
Cleaning can be performed using water for dry dust or in a bath containing soap or detergent in the case of greasy dust. Petrol or chloroethylene can also be used.
After cleaning the alternator, it is essential to check the winding insulation (see sections 3.2. and 4.8.).

4.3 - Fault detection

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

Repeat the operations defined in section 3.

4.4 - Mechanical defects

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

4.5 - Electrical faults

Fault	Action	Effect	Check/Cause
No voltage at no load on start-up	Connect a new battery of 4 to 12 volts to terminals E- and E+, respecting the polarity, for 2 to 3 seconds	The alternator builds up and its voltage is still correct when the battery is removed.	- Lack of residual magnetism
		The alternator builds up but its voltage does not reach the rated value when the battery is removed.	- Check the connection of the voltage reference to the AVR - Faulty diode - Armature short-circuit
		The alternator builds up but its voltage disappears when the battery is removed.	- Faulty AVR - Field windings open circuit (check winding) - Main field winding open circuit (check the resistance)
Voltage too low	Check the drive speed	Correct speed	Check the AVR connections (possible AVR failure) - Field windings short-circuited - Rotating diodes burnt out - Main field winding short-circuited - Check the resistance
		Speed too low	Increase the drive speed (Do not touch the AVR voltage pot. (P2) before running at the correct speed.)
Voltage too high	Adjust AVR voltage potentiometer	Adjustment ineffective	Faulty AVR
Voltage oscillations	Adjust AVR stability potentiometer	If no effect : try normal / fast recovery modes (ST2)	- Check the speed : possibility of cyclic irregularity - Loose connections - Faulty AVR - Speed too low when on load (or LAM set too high)
Voltage correct at no load and too low when on load (*)	Run at no load and check the voltage between E+ et E- on the AVR	Voltage between E+ and E– SHUNT < 6V - AREP < 10V	- Check the speed (or LAM set too high)
		Voltage between E+ and E– SHUNT > 10V - AREP > 15V	- Faulty rotating diodes - Short-circuit in the main field. Check the resistance. - Faulty exciter armature. Check the resistance.
(*) Warning : During single-phase operation, check that the sensing wires from the AVR are connected to the correct output terminals.			
Voltage disappears during operation	Check the AVR, the surge suppressor, the rotating diodes, and replace any defective components	The voltage does not return to the rated value.	- Exciter winding open circuit - Faulty exciter armature - Faulty AVR - Main field open circuit or short-circuited
(**) Warning : The AVR internal protection may cut in (overload lost connection, short circuit).			

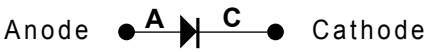
4.5.1 - Checking the winding

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

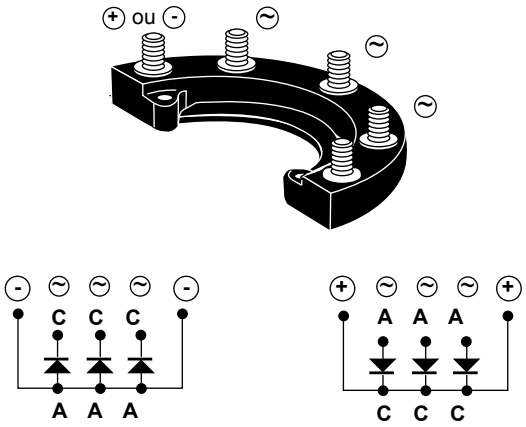
WARNING

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

4.5.2 - Checking the diode bridge



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



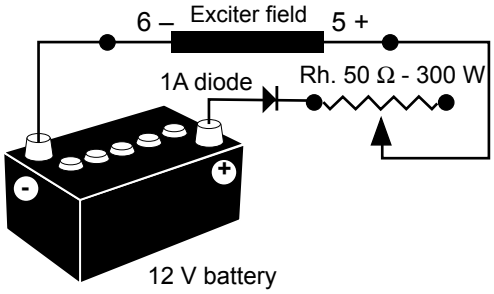
4.5.3 - Checking the windings and rotating diodes using separate excitation

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

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

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

ASSEMBLY A



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

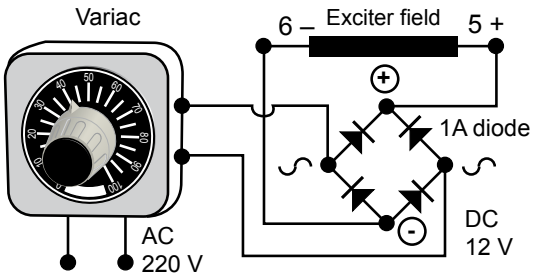
Both these systems should have characteristics which are compatible with the alternator field excitation power (see the nameplate).

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 (see the alternator nameplate or ask for the factory test report).

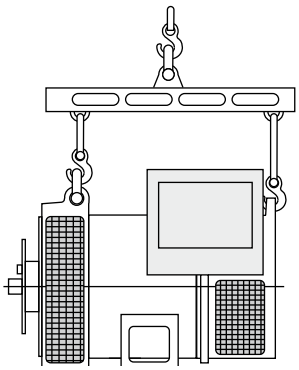
When the output voltage is at its rated value and balanced within 1 % for the rated excitation level, the alternator is in good working order. The fault therefore comes from the AVR or its associated wiring (ie. sensing, auxiliary windings).

ASSEMBLY B



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

During the warranty period, this operation must only be carried out in an approved workshop or in our factory, otherwise the warranty may be invalidated.
Whilst being handled, the alternator must remain horizontal (rotor not locked when moved). Check how much the alternator weighs (see 4.7) before choosing the lifting method.
The choice of lifting hooks or handles should be determined by the shape of the lifting rings.



4.6.1 - Tools required

To fully dismantle the alternator, we recommend using the tools listed below:
- 1 ratchet spanner + extension
- 1 torque wrench
- 1 7 mm flat spanner
- 1 8 mm flat spanner
- 1 10 mm flat spanner
- 1 12 mm flat spanner
- 1 8 mm socket
- 1 10 mm socket
- 1 13 mm socket
- 1 5 mm Allen key (eg. Facom: ET5)
- 1 6 mm Allen key (eg. Facom: ET6)
- 1 TORX T20 bit
- 1 TORX T30 bit
- 1 puller (eg. Facom: U35)
- 1 puller (eg. Facom: U32/350).

4.6.2 - Screw tightening torque

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

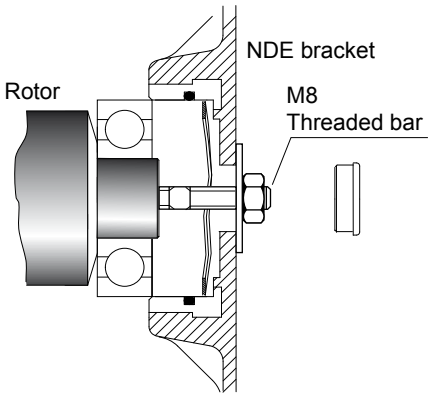
4.6.3 - Access to connections and the regulation system

The terminals are accessed by removing the terminal box lid [48].
To access the adjustment potentiometers on the AVR, the side plate should be removed [367].

4.6.4 - Accessing, checking and replacing diodes

4.6.4.1 - Dismantling
- Remove the terminal box lid [48].
- Remove the air intake louvre [51].
- Unscrew the fixing clamps on the power output cables, disconnect E+, E- on the exciter and R 791 module.
- Remove the 4 nuts on the tie rods.
- Remove the NDE bracket [36] using an extractor: eg. U.32 - 350 (FACOM).
- Remove the surge suppressor [347].
- Remove the 4 fixing screws from the diode bridges on the armature.
- Disconnect the diodes.
- Check the 6 diodes using either an ohmmeter or a battery lamp (see section 4.5.1).

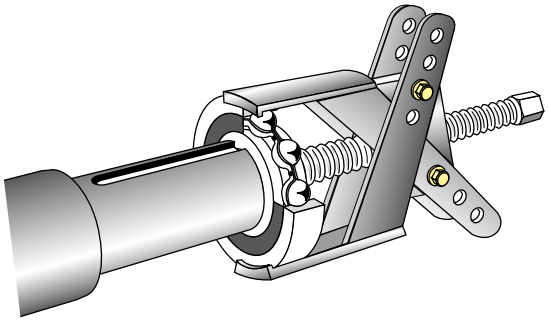
4.6.4.2 - Reassembly
- Replace the diodes, respecting the polarity (see section 4.5.1).
- Replace the surge suppressor [347].
- Insert a new O ring in the bearing housing.
- Refit the NDE bracket and pass the bundle of wires between the top bars of the flange.
- Replace the fixing clamps on the cables and the R 791 module.
- Refit the air intake louvre [51].
- Replace the terminal box lid [48].



4.6.5 - Replacing the NDE bearing on a single-bearing alternator

4.6.5.1 - Dismantling

- Dismantle the NDE bracket [36] (see section 4.6.2.1).
- Remove the bearing [70] using a puller.



4.6.5.2 - Reassembly

- Heat the inner slipring of a new bearing by induction or in a drying oven at 80 °C (do not use an oil bath) and fit it to the alternator.
- Place the preloading wavy washer [79] in the flange and fit a new O ring seal [349].
- Replace the NDE bracket [36] (see section 4.6.2.2).

4.6.6 - Replacing the bearings on a two-bearing alternator

4.6.6.1 - Dismantling

- Uncouple the alternator from the prime mover.
- Remove the 8 assembly screws.
- Remove the DE flange [30].
- Remove the NDE bracket (see section 4.6.2.1).
- Remove both bearings [60] and [70] using a puller.

4.6.6.2 - Reassembly

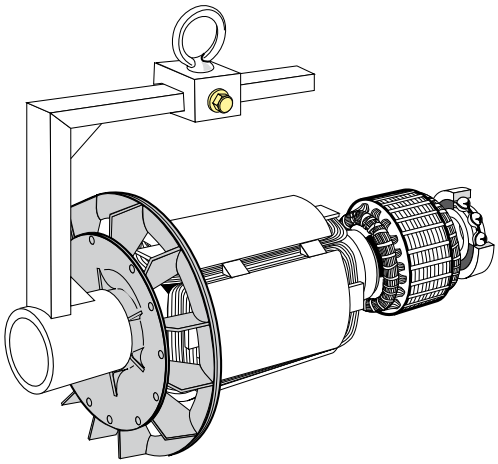
- Fit new bearings after heating them by induction or in a drying oven at 80 °C (do not use an oil bath).
- Check that both the preloading wavy washer [79] and new O ring seal have been fitted [349] on the NDE bracket [36].
- Replace the DE flange [30], and tighten the 8 fixing screws.
- Check that the whole alternator is correctly assembled and that all screws are fully tightened.

4.6.7 - Accessing the main field and stator

4.6.7.1 - Dismantling

Follow the procedure for dismantling bearings (see sections 4.6.5.1 and 4.6.5.1.)

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



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

NOTE: If intervention is required on the main field (rewinding, replacement of components), the rotor assembly must be rebalanced.

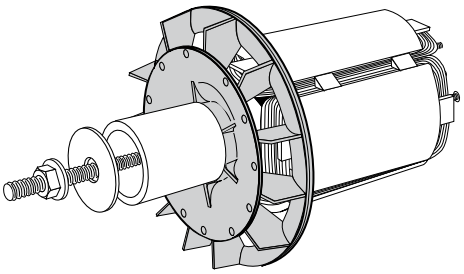
Do not use the fan to turn the alternator rotor

4.6.7.2 - Reassembly

- Follow the dismantling procedure in reverse order.

Take care not to knock the windings when refitting the rotor in the stator.

If you replace the fan, respect the assembly guide according the following bellow. Use a tube and a screw.



Follow the procedure for reassembling the bearings (see section 4.6.5.2 and 4.6.6.2).

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

LSA 42.2 - 2 & 4 POLE
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4.7 - Electrical characteristics table

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

4.7.1 - 3-phase : 2 pole with SHUNT excitation

Resistances at 20 °C (Ω)

LSA 42.2	VS0*	VS2*	S3*	S4*	M5	M6	L7	VL8
L/N stator	1,01	0,76	0,61	0,4	0,22	0,22	0,16	0,1
Rotor	2,93	3,13	3,24	3,53	4,1	4,1	4,7	5,5
Field	23,5	23,5	23,5	23,5	23,5	23,5	23,5	23,5
Armature	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79

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

LSA 42.2	VS0*	VS2*	S3*	S4*	M5	M6	L7	VL8
No-load	0,45	0,4	0,4	0,4	0,45	0,45	0,4	0,4
At rated load	1,6	1,7	1,7	1,7	1,55	1,85	1,7	1,65

* Lister type machine

4.7.2 - Dedicated single phase : 2 pole with SHUNT excitation

Resistances at 20 °C (Ω)

LSA 42.2	VS2	S3	S4	M6	L7
L/N stator	0,36	0,294	0,190	0,108	0,077
Rotor	3,13	3,24	3,53	4,1	4,7
Field	23,5	23,5	23,5	23,5	23,5
Armature	0,79	0,79	0,79	0,79	0,79

Field excitation current i exc (A) - 240 V - 60 Hz
Symbols : “i exc” : excitation current of the exciter field.

LSA 42.2	VS2	S3	S4	M6	L7
No-load	0,26	0,25	0,27	0,28	0,26
At rated load	0,9	0,9	0,91	0,9	0,92

4.7.3 - 3-phase : 4 pole with SHUNT excitation

Resistances at 20 °C (Ω)

LSA 42.2	VS0*	VS2*	S3*	S4*	S5	M6	M7	L9
L/N stator	1,54	0,7	0,53	0,32	0,32	0,2	0,2	0,19
Rotor	1,71	2,1	2,3	2,7	2,7	3,3	3,3	3,7
Field	25,6	25,6	25,6	25,6	25,6	25,6	25,6	25,6
Armature	0,51	0,51	0,51	0,51	0,51	0,51	0,51	0,51

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

LSA 42.2	VS0*	VS2*	S3*	S4*	S5	M6	M7	L9
No-load	0,5	0,6	0,5	0,6	0,6	0,5	0,5	0,5
At rated load	1,5	1,6	1,65	1,4	1,6	1,3	1,5	1,5

* Lister type machine

4.7.4 - 3-phase : 4 pole with AREP excitation

Resistances at 20°C (Ω) :

LSA 42.2	VS2*	S4	S5	M6	M7	L9
L/N stator	0,76	0,34	0,34	0,22	0,22	0,2
Rotor	2,1	2,7	2,7	3,3	3,3	3,7
Auxil. wind. X1, X2	0,5	0,3	0,3	0,26	0,26	0,23
Auxil. wind. Z1, Z2	0,6	0,5	0,5	0,44	0,44	0,41
Field	6	6	6	6	6	6
Armature	0,5	0,51	0,51	0,51	0,51	0,51

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

TYPE 42.2	VS2*	S4	S5	M6	M7	L9
No-load	0,9	0,9	0,9	0,8	0,8	0,7
At rated load	2,4	2,1	2,3	2	2,3	2,3

* Lister type machine

4.7.5 - Dedicated single phase : 4 pole with SHUNT excitation

Resistances at 20 °C (Ω)

LSA 42.2	VS2	S3	S5	M7	L9
L/N stator	0,330	0,248	0,147	0,072	0,063
Rotor	2,1	2,3	2,7	3,3	3,7
Field	25,6	25,6	25,6	25,6	25,6
Armature	0,51	0,51	0,51	0,51	0,51

Field excitation current i exc (A) -240 V - 60 Hz
Symbols : “i exc” : excitation current of the exciter field

LSA 42.2	VS2	S3	S5	M7	L9
No-load	0,45	0,43	0,46	0,61	0,62
At rated load	1,21	1,21	1,1	1,05	1,17

4.7.6 - Table of weights

LSA 42.2 2P	Total (kg)	Rotor (kg)
VS0	125	40
VS2	125	40
S3	125	40
S4	125	40
M5	125	40
M6	125	40
L7	145	45
VL8	165	50

LSA 42.2 4P	Total (kg)	Rotor (kg)
VS2	125	40
S4	125	40
S5	125	40
M6	145	50
M7	145	50
L9	145	60

5 - SPARE PARTS

5.1 - First maintenance parts

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

No.	Description	Qty	LSA 42.2 - SHUNT 2 & 4 P	Coding
198	Voltage regulator (AVR)	1	R 250	AEM 110 RE 019
343	Diode bridge assembly	1	LSA 411.1.59/60	ESC 025 MD 008
347	Surge suppressor	1	LSA 411.1.17A	AEM 000 RE 126
	AVR fuse	1	250 V - 8 A / slow	

No.	Description	Qty	LSA 42.2 - AREP 4 P	Coding
198	Voltage regulator (AVR)	1	R 438	AEM 110 RE 003
343	Diode bridge assembly	1	LSA 411.1.59/60	ESC 025 MD 008
347	Surge suppressor	1	LSA 411.1.17A	AEM 000 RE 126
	AVR fuse	1	250 V - 8 A / slow	

5.2 - Description of bearings

No.	Description	Qty	LSA 42.2 - 2 & 4 P	Coding
60	D.E. bearing	1	6309 2RS/C3	RLT 045 TN 030
70	N.D.E. bearing	1	6305 2RS/C3	RLT 025 TN 030

5.3 - Technical support service

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

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

WARNING

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

LSA 42.2 - 2 & 4 POLE
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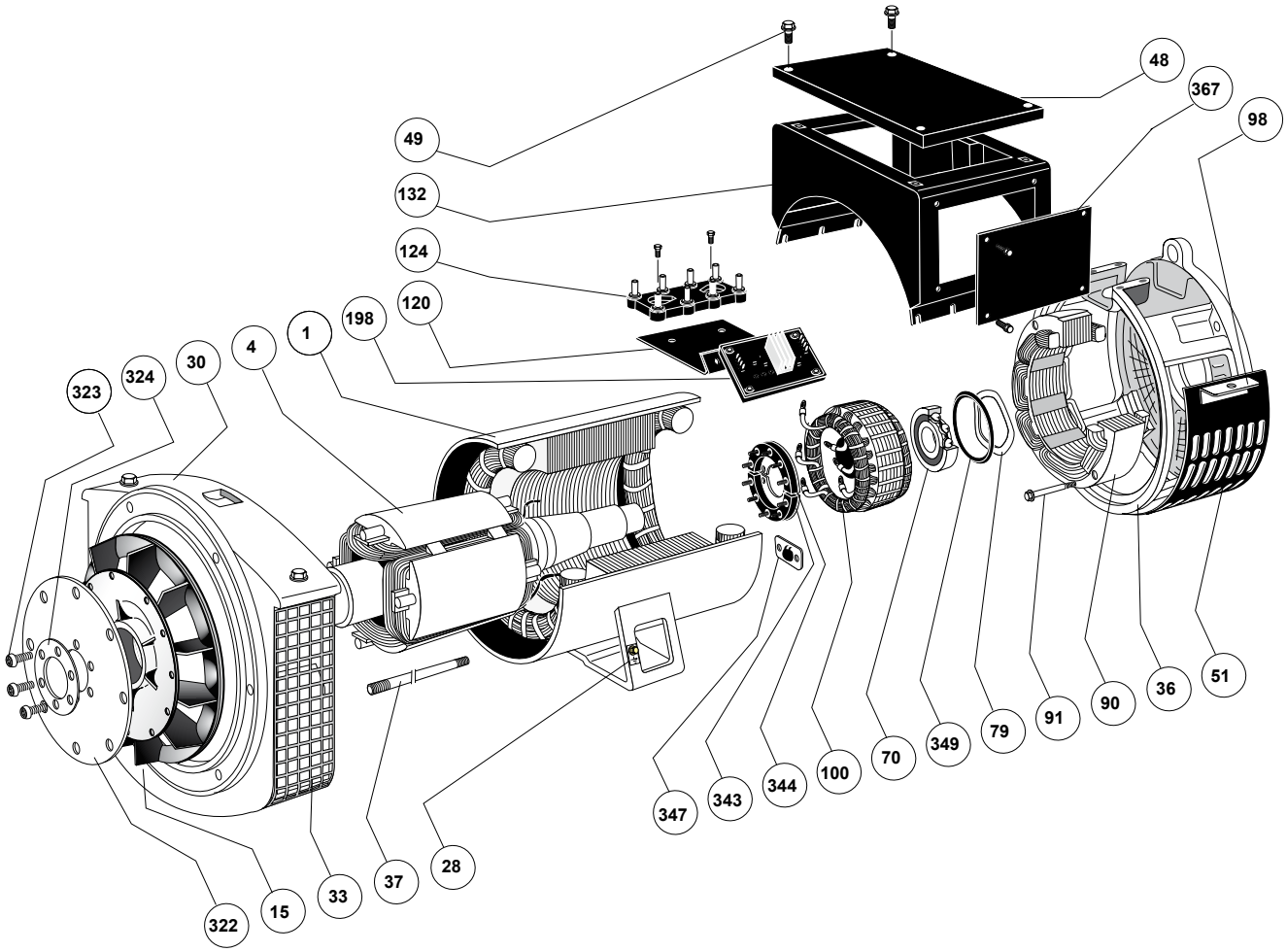
5.4 - Exploded view, parts list

5.4.1 - LSA 42.2 single bearing, AREP or SHUNT

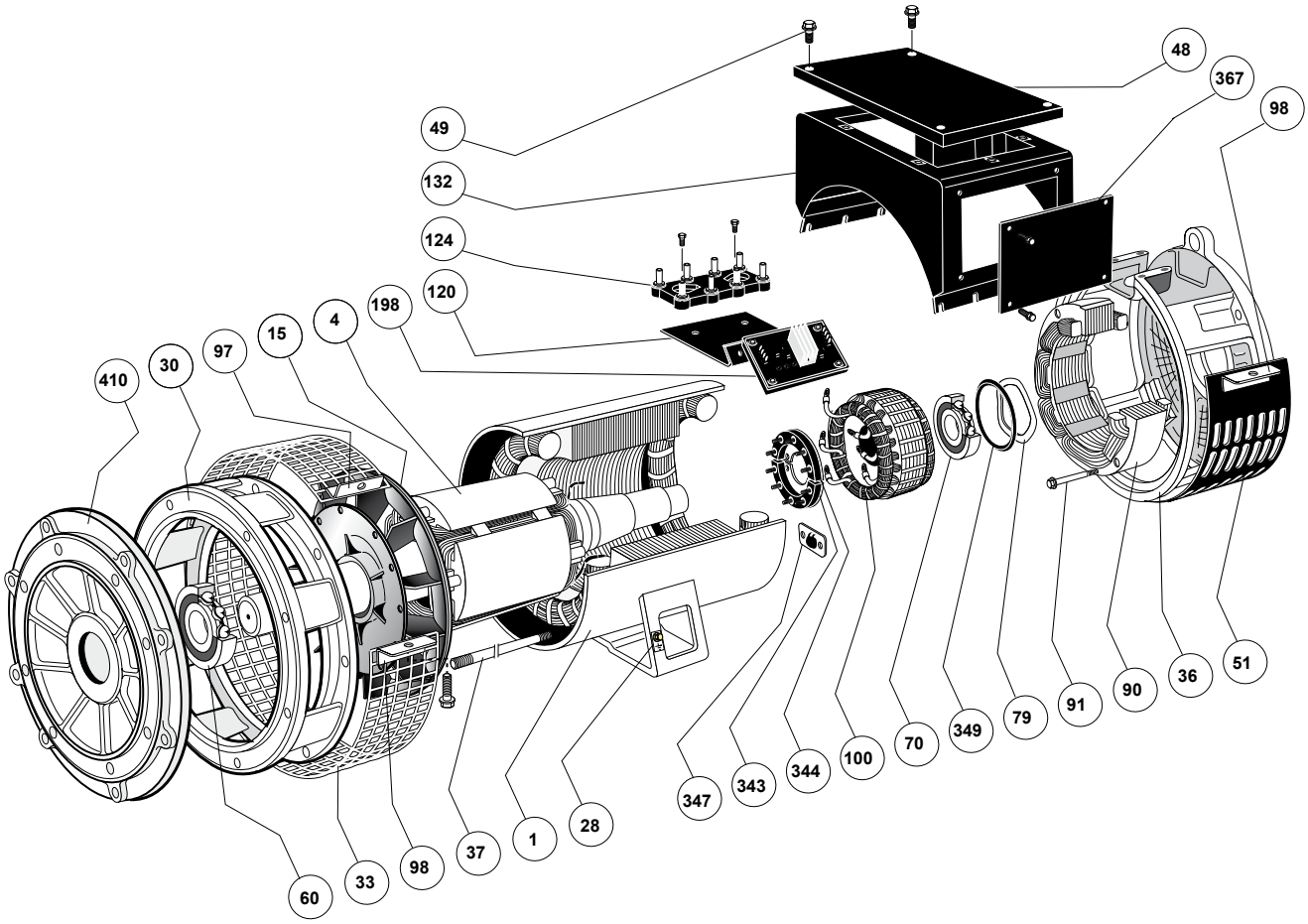


No.	Nbr.	Description	No.	Nbr.	Description
1	1	Stator assembly	98	3	Corner plate
4	1	Rotor assembly	100	1	Exciter armature
15	1	Fan	120	1	Terminal plate support (AREP)
28	1	Earth terminal	124	1	Terminal plate
30	1	DE flange	132	1	Terminal box
33	1	Air outlet grille	198	1	Regulator (AVR)
36	1	N.D.E. bracket	322	1	Coupling disc
37	4	Tie rod	323	6	Fixing screw
48	1	Terminal box lid	324	1	Clamping washer
49	20	Terminal box fixing screw	343	1	Direct diode assembly
51	1	Air intake grille	344	1	Reverse diode assembly
70	1	NDE bearing	347	1	Surge suppressor
79	1	Preloading wavy washer	367	2	Inspection door
90	1	Wound exciter field	349	1	O ring seal
91	4	Field fixing screw			

LSA 42.2 - 2 & 4 POLE

ALTERNATORS

5.4.2 - LSA 42.2 two-bearing, AREP or SHUNT



No.	Nbr.	Description	No.	Nbr.	Description
1	1	Stator assembly	91	4	Field fixing screw
4	1	Rotor assembly	97	1	Corner plate male
15	1	Fan	98	3	Corner plate
28	1	Earth terminal	100	1	Exciter armature
30	1	DE flange	120	1	Terminal plate support (AREP)
33	1	Air outlet grille	124	1	Terminal plate
36	1	N.D.E. bracket	132	1	Terminal box
37	4	Tie rod	198	6	Regulator (AVR)
48	1	Terminal box lid	343	1	Direct diode assembly
49	20	Terminal box fixing screw	344	1	Reverse diode assembly
51	1	Air intake grille	347	1	Surge suppressor
60	1	DE bearing	367	2	Inspection door
70	1	NDE bearing	349	1	O ring seal
79	1	Preloading wavy washer	410	1	DE flange
90	4	Wound exciter field			

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

4152 en – 12.2009 / c

MOTEURS LEROY-SOMER 16015 ANGOULÊME CEDEX - FRANCE

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

http://www.leroy-somer.com