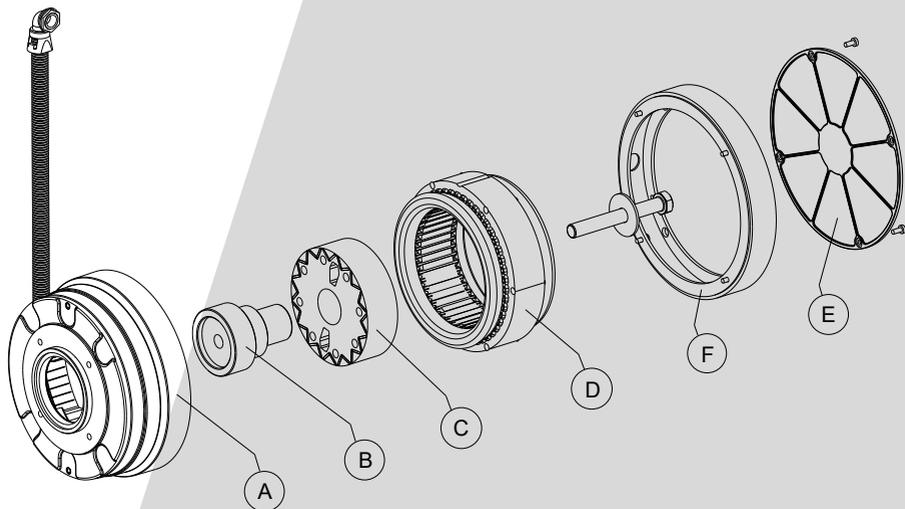




Power



PMG range

Low Voltage Alternator - 4 poles

Installation and maintenance

PMG range

Low Voltage Alternator - 4 poles

This manual concerns the PMG 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.

PMG range

Low Voltage Alternator - 4 poles

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Disposal and recycling instructions



All servicing or repair operations carried out on the PMG and the alternator should be undertaken by personnel trained in the commissioning, servicing and maintenance of electrical and mechanical components ; they must wear personal protective equipment appropriate for mechanical and electrical hazards.

PMG range

Low Voltage Alternator - 4 poles

1 - GENERAL INFORMATION

1.1 - Description

The PMG (Permanent Magnet Generator) is a system which is used to supply the short-circuit current to the alternator.

The PMG produces an AC current proportional to the speed, used as field excitation power by the AVR.

The PMG assembly forms a rotating part which can be fitted at the rear of the alternator as required.

Operating temperature:

- 20°C to + 70°C

Storage temperature:

- 55°C to + 85°C

1.2 - Identification

There are 12 types of PMG suitable for the LSA and TAL0 ranges of alternators.

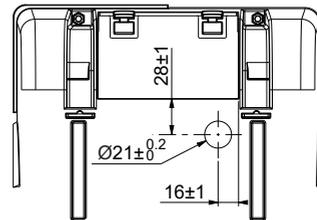
Type	PMG	Standard AVR
LSA 42.3	0	D350
LSA 44.3	7	D350
LSA 46.2*	2	R450
LSA 46.3	2	D350
LSA 47.2*	2	D350
LSA 47.3	2	D350
LSA 49.1*	3	R450
LSA 49.3	8	D350
LSA 50.2	5	D350
LSA 52.3	8	D550
LSA 53.2	8	D550
LSA 54.2	8	D550
LSA 55.3	8	D550
TAL 042	G3	R180
TAL 044	H3	R180
TAL 046	J3	R180
TAL 047*	2	R180
TAL 0473	K3	R180
TAL 049	L3	R180

* Obsolete

D350 or D550 (option on TAL0) digital regulators are compatible with all types of PMG. Other regulators can be associated with our PMGs, consult us.

WARNING

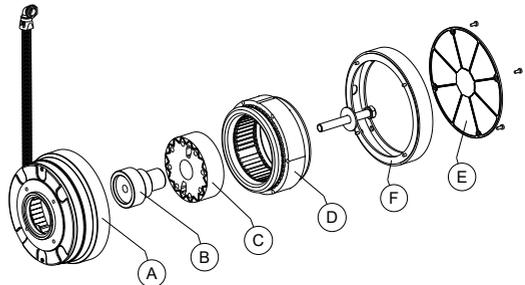
When mounting on an alternator SHUNT LSA 42.3 or TAL 042, if the voltage is higher than 480V respect drilling according to the drawing below.



It is not possible to associate these options: «regreasable bearing + PMG» for LSA 42.3 and LSA 44.3.

The regreasable bearing option is not available for TAL0.

The PMG kits consist of a housing (A), a dummy shaft extension (B), a PMG rotor (C), a PMG stator (D), a cover plate (E), a spacer housing (F) (PMG 3 and PMG 8 only) and a bag of accessories for mounting and electrical connection.



PMG range

Low Voltage Alternator - 4 poles

2 - OPERATION

2.1 - PMG excitation system

With PMG excitation, the permanent magnet generator added to the alternator supplies the AVR with voltage which is independent of the main alternator winding. It is fitted at the rear of the machine and is connected to the AVR (the ST9 jumper must be disconnected).

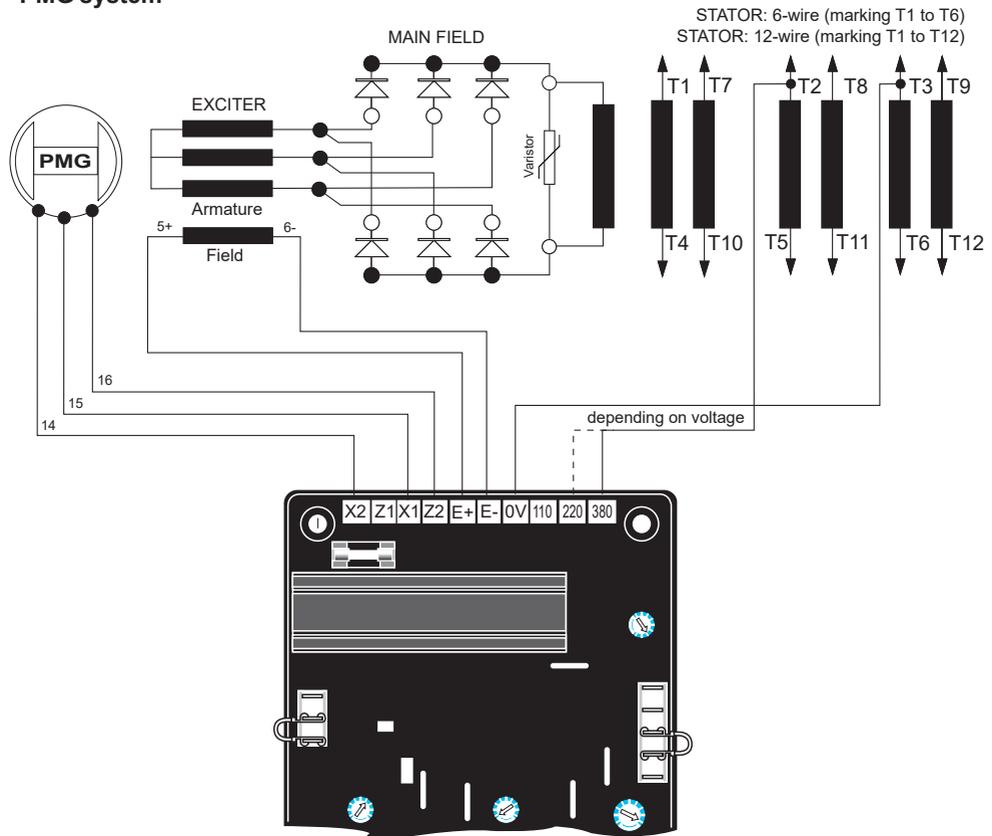
As a result the machine has a short-circuit current capacity of 3 IN for 10 s.

The AVR monitors and corrects the alternator output voltage by adjusting the excitation current.

WARNING

The PMG only works with D350, D550, R180, R449 or R450 (incompatible with the R120, R121, R150, R220, R221 and R250 AVRs).

• PMG system



PMG range

Low Voltage Alternator - 4 poles

2.2 - Electrical characteristics

Type	Stator phase/phase resistance at 20°C Ohms	No-load voltage at 1500 min ⁻¹ V	No-load voltage at 1800 min ⁻¹ V
PMG 0	0.77	85	105
PMG 2	2.1	125	150
PMG 3	2.1	125	150
PMG 4	1.4	204	245
PMG 5	0.87	130	156
PMG 7	0.77	85	105
PMG 8	0.72	146	175
PMG G3	2.59	157	188
PMG H3	2.59	157	188
PMG J3	2.59	157	188
PMG K3	2.59	157	188
PMG L3	1.06	180	217

PMG range

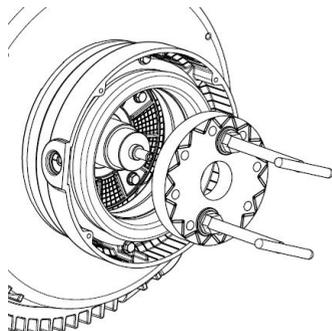
Low Voltage Alternator - 4 poles

3 - INSTALLATION - COMMISSIONING



Before working on the alternator, ensure that it cannot be started by a manual or automatic system by isolating the power (disconnection of all electrical, mechanical power, etc.) in any cabinets and that you have understood the system operating principles.

Tooling for insertion and pulling lamination sheet rotor could be delivered, the kit includes the 2 pieces needed.



3.1 - Mounting the PMG 0, 2, 3, 7, G3, H3, J3 and K3

WARNING

Make sure the bevel washers are fitted the right way round.



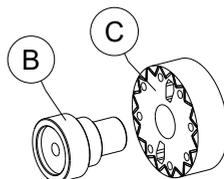
- Remove the alternator NDE bracket seal.
- Mount the PMG housing assembly [A] on the bracket, take care to position the cable through-holes at 9 o'clock as seen from the non-drive end, and tighten the 4 HM6 screws to a torque of 8.3 Nm (PMG 0, self-tapping screws tightened to 10 Nm).

- Put a coating of anti-vibration adhesive on the tie rod and screw it tight on the alternator shaft extension.

- Mount the magnetised rotor [C] on the shaft adapter [B].



Magnetic force: risk of pinching.

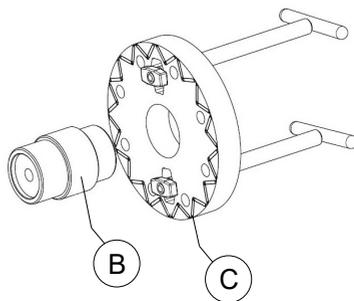


- Using 2 M10 threaded rods screwed into the rotor, slide the assembly onto the tie rod.

- Once the rotor is in position, remove the M10 tie rods.

- Mount the cable gland washer.

For lamination sheet rotor: use tooling by insertion into two hexagonal holes instead of threaded rods.



- Lock the assembly with the M10 nut (PMG 0, 7, G3 and K3) to a torque of 30 Nm or the M16 nut (PMG 2, 3, H3 and J3) to a torque of 116 Nm.

- Pierce the cover (Ø 21 hole) or remove the plastic plug on the NDE panel.

- Fit the plastic sheath and its two ferrules, while inserting the 3 PMG wires.

- Close the PMG with the cover [E].

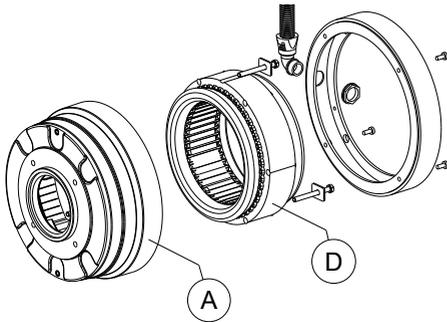
PMG range

Low Voltage Alternator - 4 poles

3.2 - Mounting the PMG L3

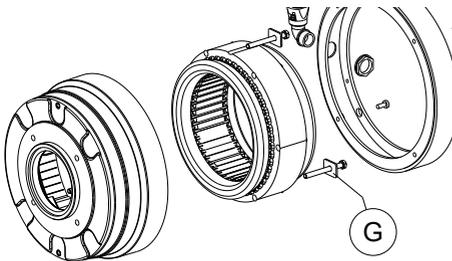
- Remove the protection cover from the NDE bracket of the alternator (4 hexagonal screws).

- Fit the housing [A] into the NDE bracket, then fasten it using the 4 M6 hexagonal screws (torque: 8.3 N.m).

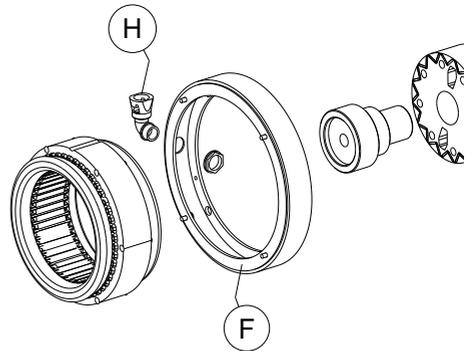


- Slide the PMG stator [D] into the housing [A].

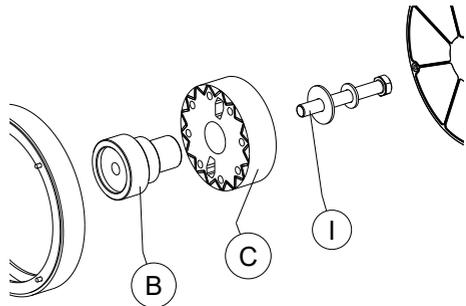
- Fasten the stator using M6 screws + washers [G] (torque: 8.3 N.m).



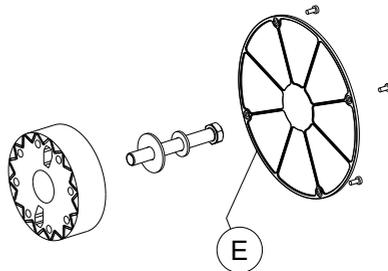
- Position the spacer housing [F] while inserting the stator output wires through the duct [H], then fasten the spacer housing using the 4 M5 screws (torque: 5 N.m).



- Position the rotor [C] on the out-of-round on the shaft [B], insert the assembly into the PMG, and then tighten with the screws and washers [I] (torque: 115 N.m).



- Fasten the cover plate [E] using the 4 M5 screws (torque: 5 N.m).



PMG range

Low Voltage Alternator - 4 poles

3.3 - Mounting the PMG 4

WARNING

For initial assembly, provide the mounting flange and the spacer (see spare parts).

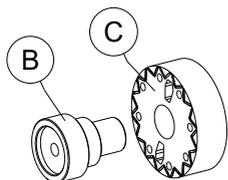
Make sure the bevel washers are fitted the right way round.



- Remove the air intake grille from the alternator NDE bracket.
- Put a coating of anti-vibration adhesive on the tie rod and screw it tight on the alternator shaft extension.
- Mount the magnetised rotor [C] on the shaft adapter [B].

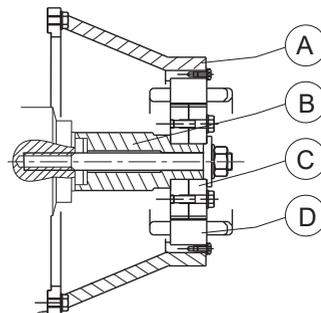


Magnetic force: risk of pinching.



- Position the assembly on the alternator NDE shaft extension.
- Mount the cable gland washer.
- Lock the assembly with the M20 nut (torque of 254 Nm).
- Mount the stator in the PMG housing and tighten the HM 6 screws to a torque of 8 Nm.
- Fit the PMG stator assembly on the alternator NDE bracket.
- Tighten the five HM 10 stator assembly screws to a torque of 20 Nm.
- Finally, fit the air intake grille.

Sectional diagram of the PMG 4



3.4 - Mounting the PMG 5

WARNING

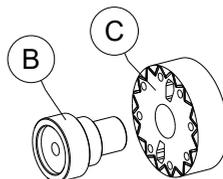
Make sure the bevel washers are fitted the right way round.



- Remove the air intake grille from the alternator NDE bracket.
- Mount the magnetised rotor [C] on the shaft adapter [B].



Magnetic force: risk of pinching.



- Position the assembly on the alternator NDE shaft extension.
- Position the large cable gland washer on the two rotor pins.
- Tighten the M16 screw with its serrated washer to a torque of 170 Nm.

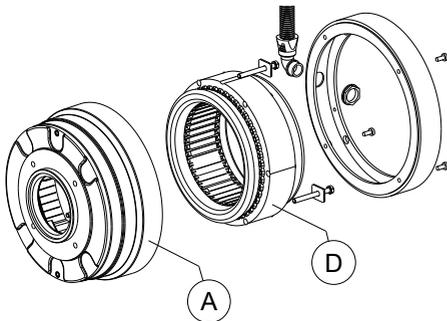
PMG range

Low Voltage Alternator - 4 poles

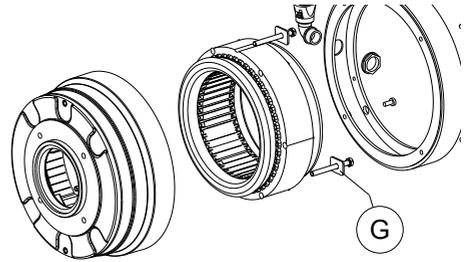
- Screw two 200 mm long M6 threaded rods into the alternator NDE bracket on the opposite side.
- Slide and position the PMG housing assembly [A] on the NDE shield spigot, turning the cable exit hole to 9 o'clock as seen from the alternator non-drive end.
- Slide the PMG stator onto the threaded rods, taking care to orient the flying leads opposite the hole in the housing.
- Once the stator has been brought close and correctly oriented, screw two M6x90 screws with the bevel washers and unscrew the M6 tie rods, then finish mounting with the other two M6x90 screws.
- Tighten the four M6 screws in a cross to a torque of 8.3 Nm, taking care to bring the stator close first.
- Remove the plastic plug on the NDE panel.
- Fit the plastic sheath and its two ferrules while inserting the 3 PMG wires.
- Close the PMG with the cover [E].

3.5 - Mounting the PMG 8 for LSA 49.3

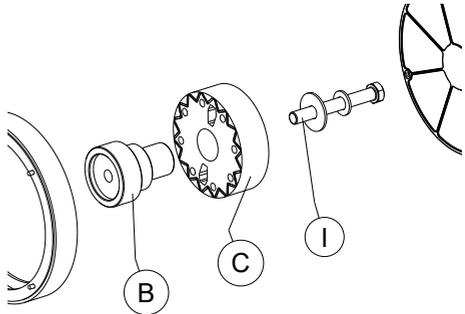
- Remove the protection cover from the NDE bracket of the alternator (4 hexagonal screws).
- Fit the housing [A] into the NDE bracket, then fasten it using the 4 M6 hexagonal screws (torque: 8.3 N.m).



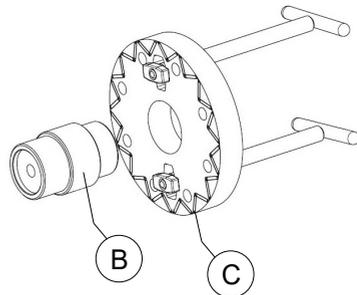
- Slide the PMG stator [D] into the housing [A].
- Fasten the stator using M6 screws + washers [G] (torque: 8.3 N.m).



- Position the rotor [C] on the out-of-round on the shaft [B], insert the assembly into the PMG, and then tighten with the screws and washers [I] (torque: 115 N.m).



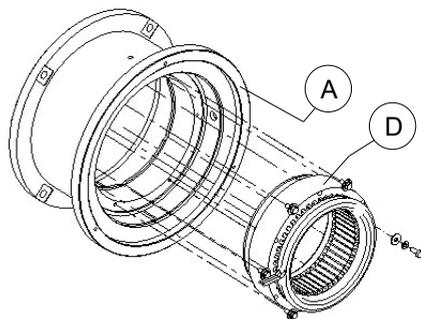
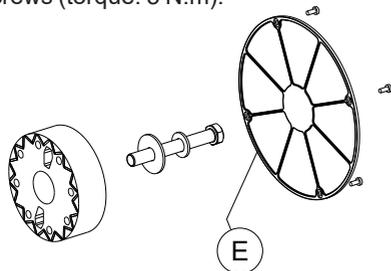
For lamination sheet rotor: use tooling by insertion into two hexagonal holes instead of threaded rods.



PMG range

Low Voltage Alternator - 4 poles

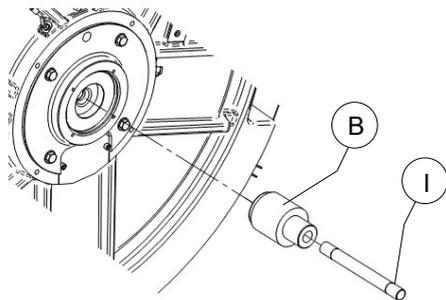
- Fasten the cover plate [E] using the 4 M5 screws (torque: 5 N.m).



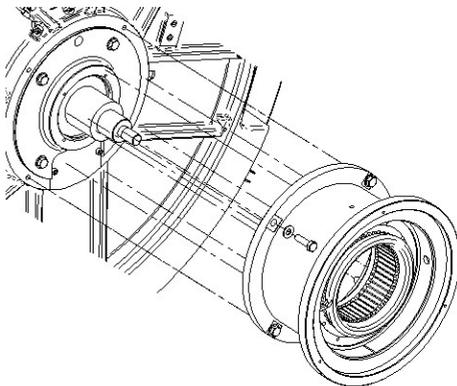
3.6 - Mounting the PMG 8 for LSA 52.3

- Remove the protection cover plate on the NDE bracket seal.

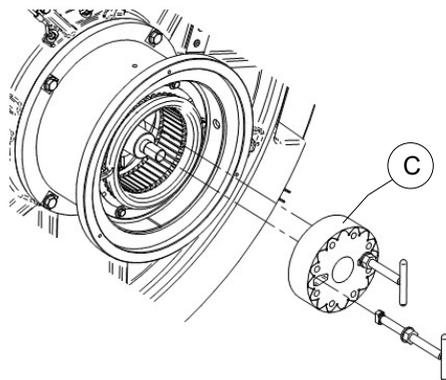
- Mount the shaft adapter [B] onto the alternator shaft with the tie rod M20 [I] (torque: 313 N.m) and anti-vibration adhesive.



- Mount the PMG stator assembly onto the alternator NDE bracket seal.



- Insert the 2 tools inside the PMG rotor [C] to facilitate assembly.



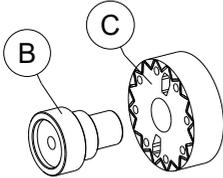
- Heat the PMG housing [A] at 120°C.
 - Slide the PMG stator [D] into the housing while protecting the stator output wires, and lock using the 4 M10 screws (torque: 37.7 N.m).

PMG range

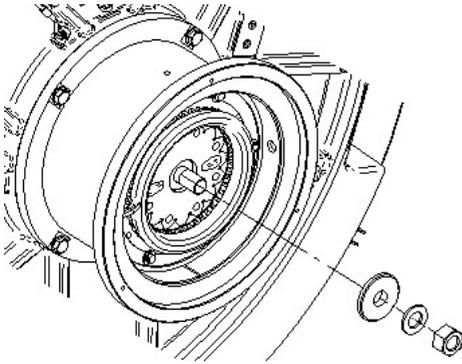
Low Voltage Alternator - 4 poles



Magnetic force: risk of pinching.



- Insert the PMG rotor [C] onto the shaft adapter [B] and finish the assembly by fitting the centring washer.

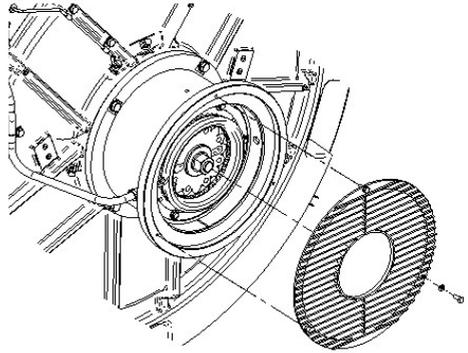


- Screw the nut and washer onto the tie rod to lock the PMG rotor assembly onto the alternator's shaft.

WARNING

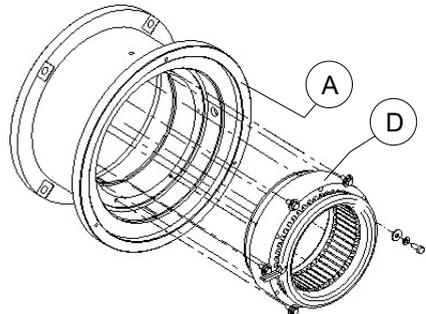
Inspect the assembly: prevent any contact between the magnetised stator and rotor.

- Mount the connectors, sheath and plastic nut, the offset loop flange, nut and screw, and the plastic cap before electrical wiring.



3.7 - Mounting the PMG 8 for LSA 53.2 and LSA 54.2

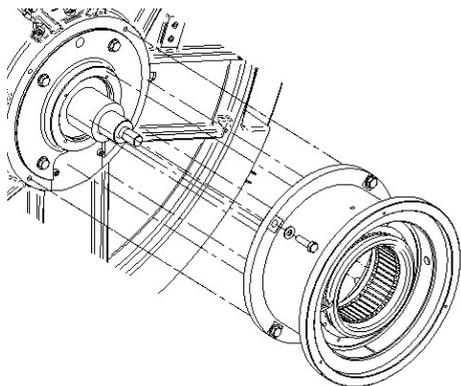
- Remove the fiber protection cover (cover + grid) on the NDE bearing shield. Keep washers and screws.
- Remove the diodes bridge then its support.
- Mount the support for diodes bridge and PMG rotor. Lock it with 3 CHC M10x30 screws (torque: 37.7 N.m).
- Mount diodes bridge with 6 CHC M6x20 screws (torque: 7.9 N.m) and cable it.
- Heat the PMG housing [A] at 120°C.
- Slide the PMG stator [D] into the housing while protecting the stator output wires, and lock using the 6 H M6x16 screws and washers (torque: 7.9 N.m) and 4 H M12 screws and washers (torque: 64.9 N.m) for the housing.



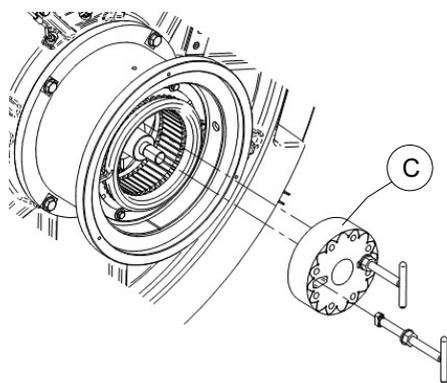
PMG range

Low Voltage Alternator - 4 poles

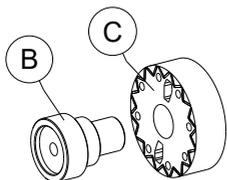
- Mount the PMG stator assembly onto the alternator NDE bearing shield with 4 H M12x40 screws and washers (torque: 64.9N.m).



- Insert the 2 tools inside the PMG rotor [C] to facilitate assembly.



Magnetic force: risk of pinching.



- Insert the PMG rotor [C] onto the support for diodes bridge and PMG rotor and finish the assembly by fitting the centering washer and lock it with H M20x50 screw and washer (torque : 313 N.m).

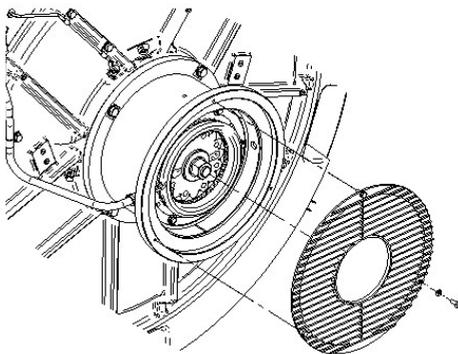
WARNING

Inspect the assembly: prevent any contact between the magnetised stator and rotor.

- Mount the spacer cover on the NDE bearing shield with 10 H M16x40 screws and washers (torque: 160 N.m).

- Mount the corner protection with 2 H M6x20 bolts (torque: 7.9 N.m) on the bottom.

- Cable electric stator wires on the connectors and assemble the fiber protection cover.



3.8 - Mounting the PMG 8 for LSA 55.3

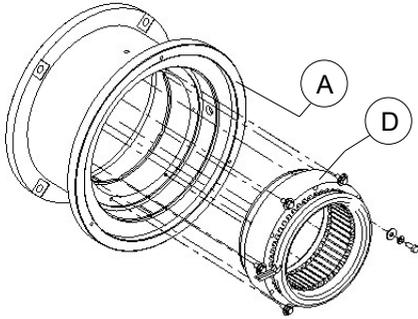
- Remove the fiber protection cover on the NDE bearing shield. Keep washers and screws.

- Mount the shaft adapter onto the diodes bridge support with 4 CHC M10x30 screws and washers (torque : 37.7 N.m).

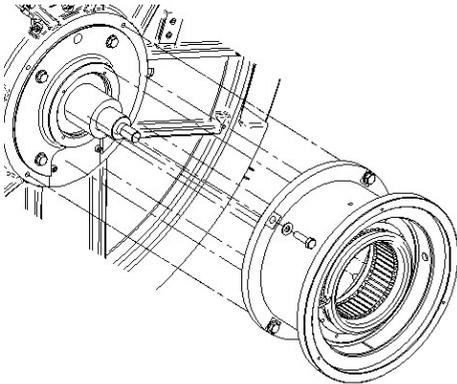
PMG range

Low Voltage Alternator - 4 poles

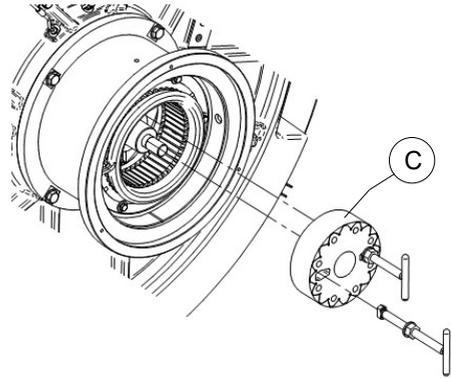
- Heat the PMG housing [A] at 120°C.
- Slide the PMG stator [D] into the housing while protecting the stator output wires, and lock using the 6 H M6x16 screws washers (torque: 7.9 N.m) and 4 H M12 screws and washers (torque: 64.9 N.m) for the housing.



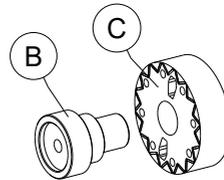
- Mount the PMG stator assembly onto the alternator NDE bearing shield with 8 H M12x30 screws and washers (torque: 64.9N.m) salvaged from removing of the fiber protection cover.



- Insert the 2 tools inside the PMG rotor [C] to facilitate assembly.



Magnetic force: risk of pinching.



- Insert the PMG rotor [C] onto the shaft adapter [B] and finish the assembly by fitting the centering washer and lock it with 4 CHC M6x25 screws and washers (torque : 7.9N.m).

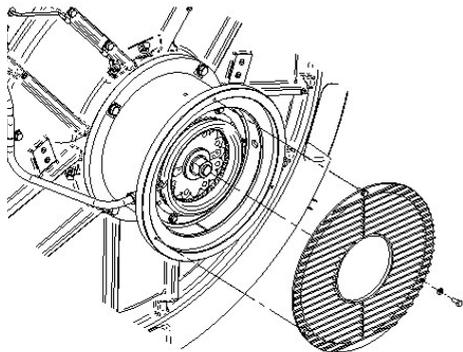
WARNING

Inspect the assembly: prevent any contact between the magnetised stator and rotor.

PMG range

Low Voltage Alternator - 4 poles

- Mount the connectors, sheath and plastic nut, the offset loop flange, nut and screw, and the plastic cap before electrical wiring.



3.9 - Electrical connection of a PMG on an AREP or AREP+ machine

- In the terminal box, stick the self-adhesive bases on the NDE bracket and on the terminal block to bring the PMG wires into the AVR.

- Next, attach the sheath with the PMG wires to the self-adhesive bases using plastic clamps.

- Make a bridge around the shield spigot to avoid the sheath quickly becoming damaged and the risk of a short-circuit.

- Connect the 3 PMG wires (14/15/16), to terminals X1, X2, Z2 on the AVR. The 4 auxiliary winding wires X1.X2.Z1.Z2 should be isolated using the domino fitting supplied with the kit. Both the field wires (5/6) and the voltage sensing wires (2/3) remain in place.



When using a PMG as an AREP or AREP+ alternator, a modification of the instability adjustment (regulator stab potentiometer) may be necessary. Check that the ST9 jumper on the AVR is open.



After operational testing, replace all access panels or covers.

3.10 - Electrical connection of a PMG on a SHUNT machine

WARNING

If mounting a PMG, replace the following regulators.

3.10.1 - For the LSA range

PMG 0: replace R220 by D350

PMG 7: replace R220 by D350

PMG 2: replace R250 by D350

- Disconnect the connection wires from the R220 or R250 and remove the AVR.

- Take out both the voltage reference wires, marked 2 and 3, by removing them from the terminals (T8 and T11) in which they are inserted.

- Use these same wires for voltage sensing on the D350 by inserting them in terminals T2 (wire 2) and T3 (wire 3).

- Fit the AVR support plate fitted with the D350 (2 HM6 screws tightened to 10 Nm / PMG 0, 4M5 self-tapping screws tightened to 6 Nm).

- In the terminal box, stick the self-adhesive bases on the NDE bracket and on the terminal block to bring the PMG wires into the AVR.

- Next, attach the sheath with the PMG wires to the self-adhesive bases using plastic clamps.

- Make a bridge around the shield spigot to avoid the sheath quickly becoming damaged and the risk of a short-circuit.

- Connect the 3 PMG wires (14/15/16), the 2 exciter field wires (5/6) and the 2 previously mentioned voltage sensing wires (2/3) according to the internal connection diagram in the alternator maintenance manual.

PMG range

Low Voltage Alternator - 4 poles

3.10.2 - For the TAL0 range

Replace R120/R150 by R180

- Disconnect the connection wires from the R120 or R150 and remove the AVR.
- Take out the 3 voltage and power supply reference wires (yellow / green / blue), by removing them from the terminals (T1, T2 and T5) in which they are inserted.
- Fit the AVR support plate fitted with the R180 (4M5 self-tapping screws tightened to 6 N.m).
- Rewire the 2 red wires on T2 and T3 for the voltage detection then reconnect the wires of excitation and power supply of the PMG, according to the diagram of the alternator maintenance manual.
- In the terminal box, stick the self-adhesive bases on the NDE bracket and on the terminal block to bring the PMG wires into the AVR.
- Next, attach the sheath with the PMG wires to the self-adhesive bases using plastic clamps.
- Make a bridge around the shield spigot to avoid the sheath quickly becoming damaged and the risk of a short-circuit.
- Connect the 3 PMG wires (14/15/16), the 2 exciter field wires (5/6) and the 2 previously mentioned voltage sensing wires (2/3) according to the internal connection diagram in the alternator maintenance manual.

WARNING

**With PMG excitation, check that the ST9 jumper on the AVR is open.
After operational testing, replace all access panels or covers.**

PMG range

Low Voltage Alternator - 4 poles

4 - SPARE PARTS

4.1 - Designation

Description	Code
PMG 0	4813890
PMG 0 + D350	5297839
PMG 2	4084008
PMG 2 + D350	5263102
PMG 2 + R180	5137697
PMG 3	4083924
PMG 4	Contact us
PMG 5	4533619
PMG 5 + D350	Contact us
PMG 7	4891861
PMG 7 + D350	5297847
PMG 8 (LSA 49.3)	5026424
PMG 8 (LSA 52.3)	4978551
PMG 8 (LSA 53.2)	Contact us
PMG 8 (LSA 54.2)	Contact us
PMG 8 (LSA 55.3)	Contact us
PMG G3	5203402
PMG G3 + R180	5203406
PMG H3	5203407
PMG H3 + R180	5203408
PMG J3	5203409
PMG J3 + R180	5203410
PMG K3	5203412
PMG K3 + R180	5203415
PMG L3	5203426
PMG L3 + R180	5203431
Tools PMG	5396723

4.2 - 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 type and the code number of the PMG.

WARNING

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.

PMG range

Low Voltage Alternator - 4 poles

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.

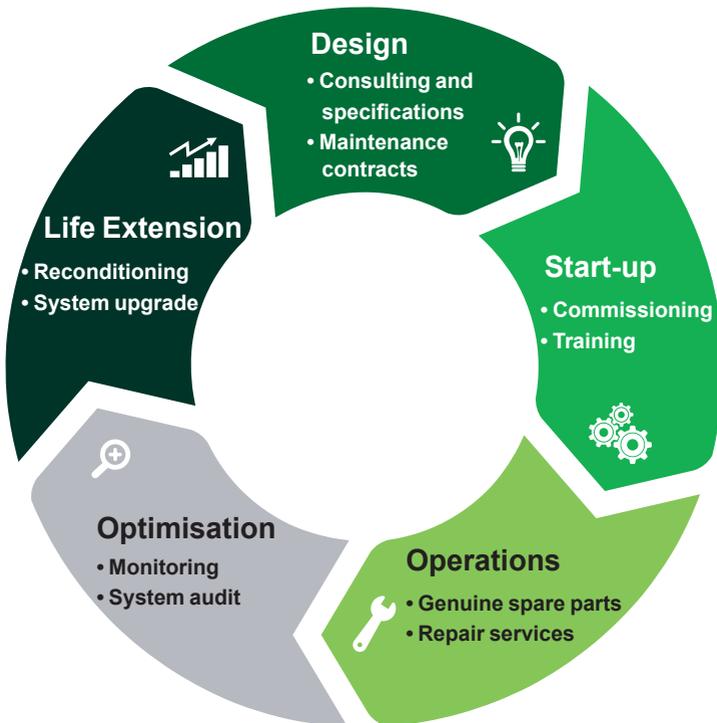
Service & Support

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:

