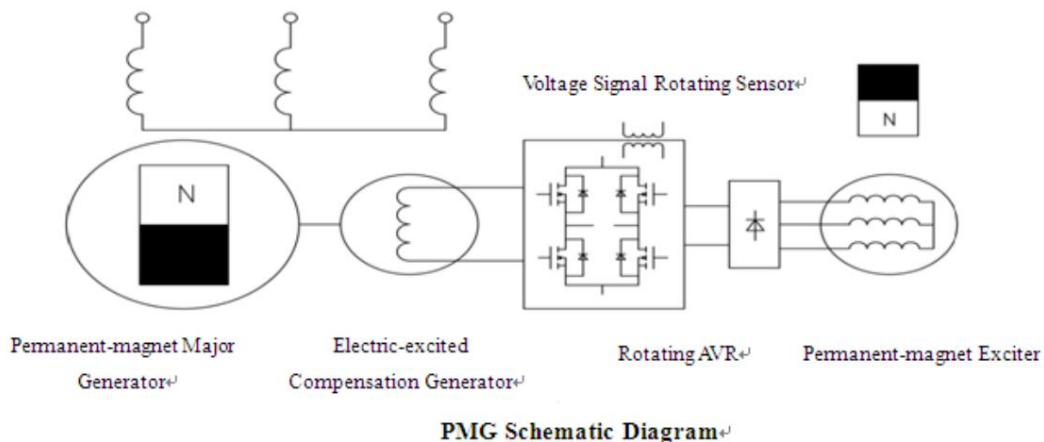


Introducing the Nanomag High Efficiency Brushless Synchronous Alternator

1. Technical Information

The NANOMAG alternator is built around a stator and field winding in the same way as the classic alternator, with the difference that with a PMG the armature is made of an ALU alloy, equipped with encapsulated super magnets, the operating principle is the same insofar as with the PMG the magnetic excitation is permanently present, while the magnetic field has to be activated with the classic generators. With the Nanomag technology, the magnetic field is automatically adjusted in function of the voltage. The automatic voltage compensation is achieved by correcting the positive and opposite excitation of the magnetic field in real time provided sensors are actuated by the sensors located on the shaft which then send their signals to the rotary AVR controller. If under load the voltage values fluctuate between higher or lower values than the specific values entered (on the AVR's trimmer) the rotary AVR controller will also automatically compensate for this in the magnetic field. The result is a perfect and extremely stable output in both voltage and Hz. **Operating principle of the NANOMAG is shown in this diagram:**



2. Technical lead of the nanomag alternators

While the PMG technology has a range of positive features, including brushless, simple structure, smaller housing, lighter in weight, high power, high efficiency, etc., this technology also has major technical imperfections, namely: uncontrollable and difficult to control power delivery, fluctuating and unstable voltage and HZ, at zero load the magnetic field is difficult to adjust. But perhaps the main bottleneck was the need for an expensive inverter to drive the PMG. These bottlenecks have now found a solution with the unique nanomag technology.

The Nanomag super efficient line frequency brushless synchronous alternator is the successful marriage between the PMG technology and the classic alternator when using our rotary AVR controller. As a result, this technology eliminates all known defects, both in the PMG technology and in the classically wound alternators for inductive loads.

In summary, these are the exclusive features attributed to the nanomag alternators:

1. Higher efficiency rate between 5 and 10% more with the same engine power
2. A 25% less weight for the alternator (may be important for light freight)
3. A 30% more compact construction of the alternator
4. Perfect output quality, to ensure precision voltage, voltage drop Max. $\pm 1\%$;
5. Superior dynamic performance, including starting asynchronous motors (100%)!
6. Excellent for inductive and capacitive charging (e.g. ballast lamps)
7. Perfect electromagnetic compatibility
8. Little or no radio interference (military application)

3. Main Technical Features

Power series	6 kw	10kW-120kW
Rpm	3000 rpm	1500 rpm
Stable voltage setting	$\pm 1\%$	
Voltage regulation range	20% - 15%	
voltage drop	0.5S	
Voltage fluctuation margin	0.5%	
efficiency	90%	
Power Factor (cos ϕ)	± 0.8	
protection class	IP-23 (6 KW to 120 KW) IP57 (10 KW to 40 KW)	

4. Alternator comparison table nanomag/stamford

Technical specifications	Nanomag 10 KW	Stamford 10.8 KW
Power factor COS ϕ	0.85	0.8
installation height	132mm	160mm
weight	83kg	106kg
efficiency	90.31	80.7
Sine wave disturbance at zero load	2.68%	5%
Stable voltage setting	1.38%	2.5%
Transient Voltage Regulation	+13.9 % / -10.87 %	+25% / -15%
Measurement of recovery time	0.298s	1.5s

As you can see in this table, the nanomag alternator is by far the best choice, and it exceeds the highest requirements as laid down in the G3 level according to ISO8528.

5. Energy savings when using the Nanomag generator

We take the 16kW Nanomag generator as an example:

1) savings in power per hour: $16/80.4\% - 16/89.3\% = 1.9834\text{kW}$ 2) Let us assume that the average consumption of the generator engine is 238 gr/KW/hour 3) with normal use in semi-continuous work (ie 8 hours/day, 220 days/year, then we arrive at this result: $1.9834 \times 8 \times 220 \times 238 \times 10^{-3} = 1132\text{kg} = 830$ liters of diesel oil (1750 operating hours/year) 4) at the current price of 0.50 € this saves: 415 euros per year and more at 24/24 5) the same calculation can be made for the CO² emissions

6. Application:

The Nanomag technology can be used in all generators from the small 3000 rpm 6 kW to a power of 120 kW (1500 rpm). This technology finds its applications in the military industry, construction industry, mobile operators, mining industry, server rooms of banks, marine applications, and by extension any sector that benefits from a superior output coupled with lower consumption and a reduction in harmful CO₂ emissions

7. DELIVERY PROGRAM

Fashion model	NANO/K												
power (kW)	10	12	16	20	24	30	40	50	75	90	100	120	
Voltage (V)	400V												
Phase Number	3												
power factor	$\pm 0.85/\pm 0.8$												
speed (r/min)	1500												
Frequency (Hz)	50 Hz or 60 Hz												
Excitation	PMG excitation												
insulation class	F												
protection factor	IP-23 option IP-57												
installation height	132	132	160	160	160	160	180	180	200	200	225	225	
(H) weight (kg)	65	78	88	120	160	185	200	220	280	350	420	450	
efficiency (%)	88.2	89.3	89.8	90.7	91.5	91.8		92.3	92.6	93.4	93.5	93.6	93.9