



## The Easy Choice for **BTS - Telecom Power Supply**



### Fully Integrated Ready-to-use System for Telecom

**NSM** is the first company supplying a **complete DC generator** that is totally developed and manufactured in-house. Working at **variable speed**, for high fuel savings, it is integrated and calibrated for the power supply of BTS - telecom towers.

**FIRST** includes PMG, a complete electronic system with controller and actuator kit to adjust the engine revolutions. Adaptable to all types of batteries and engine models, interfacing with the control units by the main manufacturers, **FIRST** represents a **highly customizable** solution like never before.

User friendly, turnkey, extremely market oriented, **FIRST** satisfies the growing OEM demand to reduce the weight and size of the gen-set. Increased **efficiency** and optimized performance in order to drastically **reduce fuel consumption**, noise and emissions.

The refuelling interval is significantly increased as well. Not only is the extremely high efficiency an advantage for fuel consumption, but it also definitely extends both the battery and engine's life.

focus on



### User Friendly:

- **FIRST** is a turnkey, **fully integrated** DC system. Just connect the PMG to the engine, the gen-set control unit and the battery pack to have a complete functioning installation in one easy step.
- The actuator, acting directly on the accelerator lever, is extremely easy to be assembled.
- **Easier maintenance** as the PMG is without bearings nor brushes.
- Plug and play technology.

### Cost-effective:

- High reliability and durability.
- Reduced weight and size.
- The necessary refuelling and maintenance operations, which can be carried out at extended service intervals, allow for **reduced site visits**, thanks to the high efficiency and reliability of the properly sized system.
- Not only is the extremely high efficiency an advantage for the fuel consumption, but it also definitely **extends both the battery and engine's life**.

### Top-notch Technology:

- The system works at **variable speed** since the engine speed is consistently adjusted according to the load power demand (load + battery).
- **Load sharing** (between gen-set and sun converter modules in the case of hybrid installation).
- Digital inputs/outputs available for interfacing with other gen-set devices such as air conditioners, thermostats, water refill systems and so on - (available on request).
- Reduced noise and emissions of the properly sized gen-set.
- As the **NSM** controller manages the complete battery cycle, the actuator and all the system parameters, **it is not necessary to use a telecom dedicated gen-set control unit**.  
A basic control unit is required to monitor the engine's signals, to communicate with the controller by a serial communication and to display all the gen-set parameters.
- **FIRST** controller is set according to the **specific engine model's map** for an exceptionally optimized fuel consumption.
- The whole system is tailor-made according to the engine model (specific requested set-up and working rpm).



### Hybrid Compatible:

- Each model/version can host one or multiples DC/DC sun converter modules thanks to the integrated Hybrid technology.
- The system ensures that even 1 Watt coming from the photovoltaic panels is directed to the battery, while supplying the needed balance energy: **no free green power is ever wasted.**
- **FIRST** can work in parallel with the energy coming from a renewable energy source.

### Redundancy and Paralleling:

- **FIRST** can work in parallel with another complete gen-set for a 100% redundancy of the system, as the ultimate goal of the technology is to **ensure continuity of energy supply** to the installation.
- Thanks to the integrated NSM controller, two gen-sets can work either simultaneously or alternatively in a seamless way, sharing the requested power accordingly.

### Smart Battery Management:

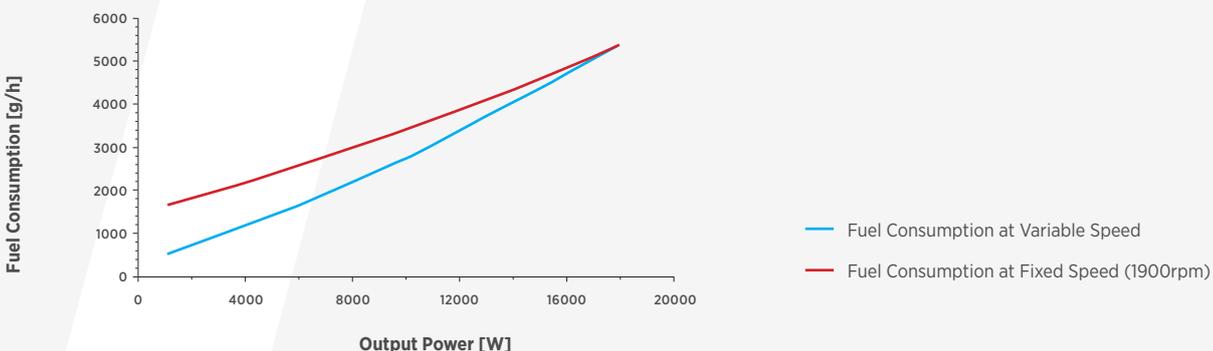
- The battery charge cycle is completely programmable according to the needs and the type of battery used.

### High Efficiency:

- Variable speed plays a key role in significantly reducing the fuel consumption. The result is an amazingly high efficiency on all range (from 88 to 90%) and consistently throughout the whole cycle, not only at the maximum power. (Standard constant speed AC alternators maximum efficiency is reached only at full load demand).



## Example of a Typical Fuel Consumption Chart





## PMG-DCs

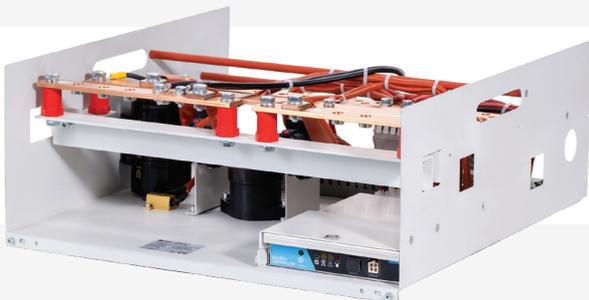
### Permanent Magnet Generator

+ DCs System

+ Actuator kit

#### Key features:

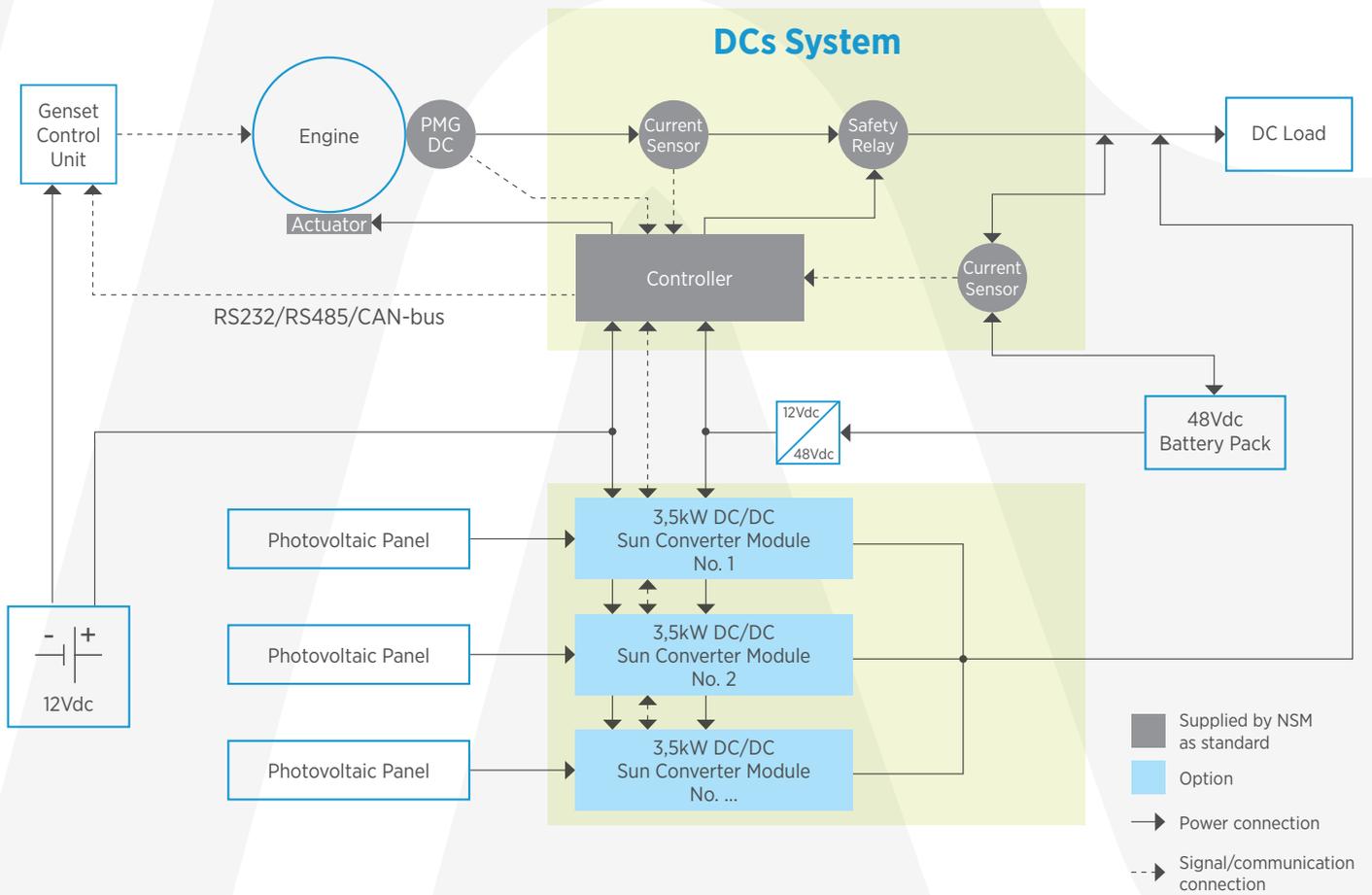
- **Built-in rectifier bridges** on the PMG granting DC output power directly from the generator.
- Speed range: the output voltage is directly connected to the engine speed.
- Voltage ripple depending on the number of engine cylinders, the weight/dimensions of the engine flywheel and the PMG. Thanks to the very high working frequency, the voltage ripple is consequently reduced.
- Protections: 2 built-in Pt100 **temperature sensors** (both on the windings and rectifier bridges) with automatic derating.





## HOW DOES PMG-DCs WORK?

### Block Diagram



Model	Max Power	Max Current						
	[kW]	[A]	[kW]	[A]	[kW]	[A]	[kW]	[A]
	1500rpm		2000rpm		2400rpm		3000rpm	
PMG-DC 150SC	3,0	54	4,0	71	4,8	86	6,0	107
PMG-DC 185SC	4,5	80	6,0	107	7,5	134	9,0	160
PMG-DC 185SF	7,5	134	8,4	150	9,0	160	9,0	160
PMG-DC 185PF	7,5	134	11,0	196	13,8	246	16,8	300
PMG-DC 295RB	13,0	232	16,0	286	18,5	330	22,0	393
PMG-DC 295RF	19,0	339	24,0	429	28,0	500	33,6	600
PMG-DC 295PH	28,0	500	30,8	550	32,5	580	33,6	600



# PMG-DCc

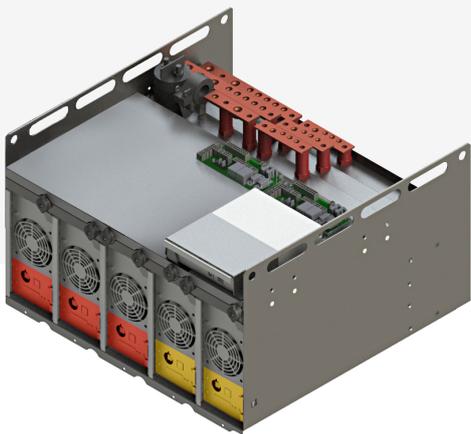
## Permanent Magnet Generator

- + DCc System
- + Actuator kit

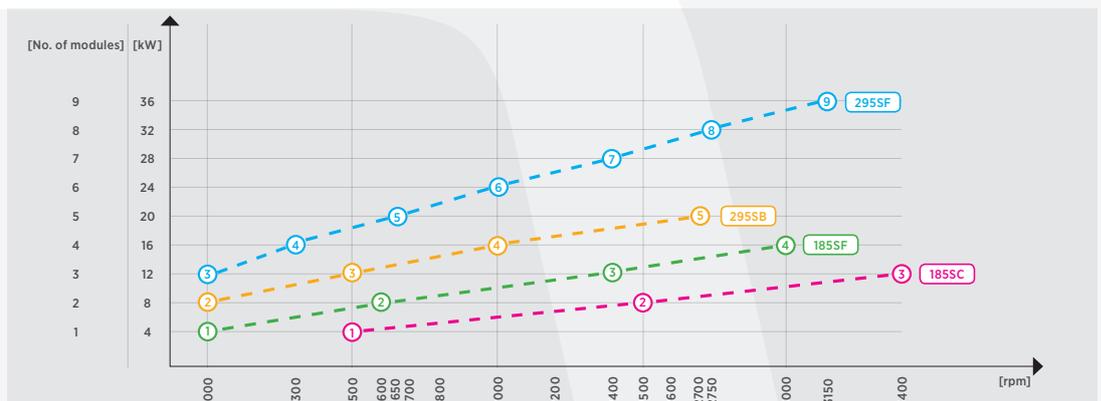
### Key features:



- The PMG has a Vac 3-phase output.
- The **grid** can be connected to the converter module (PMG must be switched off), through a transformer granting a 3-phase voltage up to 140Vac.
  - **Speed range:** the output voltage is independent of the engine speed. The range is determined at a 1:3 ratio (ex: 1000÷3000 rpm - depending on the engine).
  - **Low voltage ripple:** lower than 150 mV p-p (suitable for direct feed of telecom equipment). It is independent of the number of engine cylinders, the weight/dimensions of the engine flywheel and the PMG.
  - **Scalable:** easily increase the output power by adding multiple 4kW converter modules.
  - Complete **redundancy** of the single modules within the same system, not only of the gen-set, to grant the continuous supply of the available residual energy.
- **Load sharing** between the several converter modules.



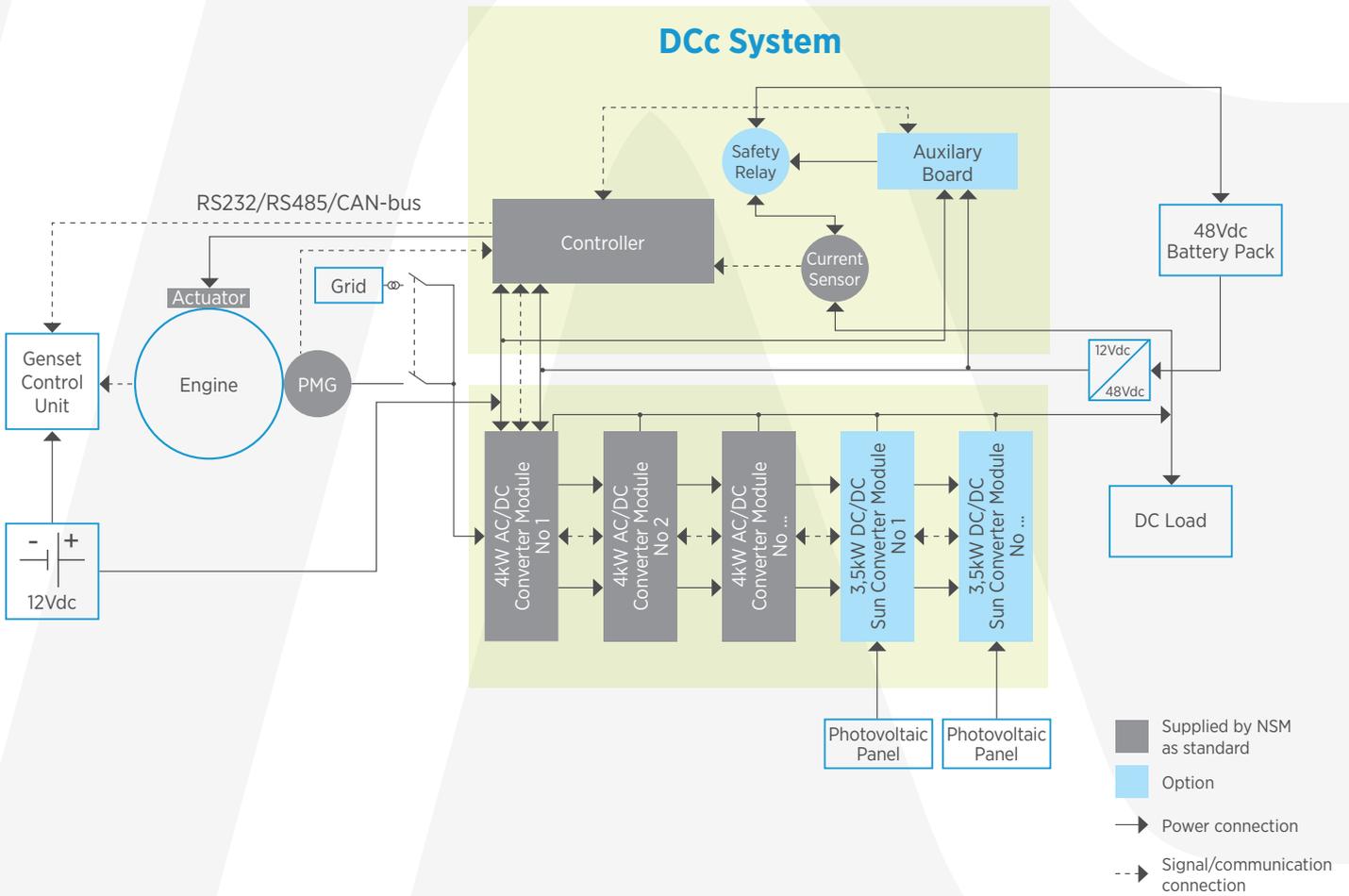
### PMG-DCc Modules Chart





## HOW DOES PMG-DCc WORK?

### Block Diagram



Model	Output Power range [kW]	Efficiency PMG + Converter (*) η%	Weight			
			PMG cone [kg]	PMG SAE 4 (**) [kg]	Dcc System (***) [kg]	Actuator [kg]
PMG-DCc 185SC	4,0 - 12,0	85 - 87	14,50	15,0	6,0	2,0
PMG-DCc 185SF	4,0 - 16,0	85 - 87	17,5	18,0	6,0	2,0
PMG-DCc 295SB	8,0 - 20,0	85 - 87	-	41,0	6,0	2,0
PMG-DCc 295SF	12,0 - 36,0	85 - 87	-	51,0	6,0	2,0

(\*) depending on load conditions - (\*\*) SAE 5 = SAE 4 - 1kg; SAE 3 = SAE 4 + 3kg - (\*\*\*) Dcc module weight not included (1 module = 3,2kg)

## AMER Group

Amer Group is a global enterprise with 6 production facilities throughout northern Italy and Switzerland; and 3 well-integrated branches providing sales, distribution & after-sales support around the world.

This network has been growing for 40 years, thanks to our commitment, to small daily improvements and especially to the strategic choice to reinvest our profits in Research & Development and facilities.

Our comprehensive custom solutions, such as generators, electronic control systems, DC motors, traction and linear motion systems, have been developed to carefully satisfy our international partners' needs.

Thanks to them, and to a tight-knit team that shares the company vision, we have become an important key player and a worldwide point of reference.

## NSM

At NSM, we are dedicated to manufacturing **synchronous alternators and welders, PTO generators, and Permanent Magnet Generators (PMG)**.

We have solid roots thanks to almost 60 years of experience in producing and exporting our high-quality machines to more than 60 countries across the world.

Consistently with our role as key industry players, we never stop researching and developing innovative solutions for whatever the future of energy generation entails.

The real value of being **Made in Italy**: a mark of origin that we can proudly bear as we are one of the very few companies boasting all the production cycles, from design to manufacturing, in our Italy-based factories.

**A 100% Italian entrepreneurial story**, capable of conquering international markets and anticipating industry trends.



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