



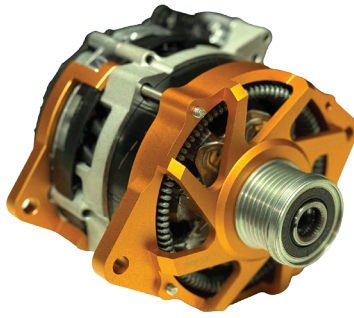
BIDIRECTIONAL MOTOR GENERATOR

and SCOTTY™ AI DC DC OPERATING MANUAL



DESIGNED AND MADE IN AUSTRALIA
DELIVERED TO THE WORLD TODAY
DREAMING OF GALAXY TOMORROW

Four Models of Safiery BMG (Bidirectional Motor Generator)



Marine Integrated Yanmar Mount SHSA4803



Marine Integrated Volvo Mount SHSA4804

Integrated Sprinter Mount SHSA4802

Suits N62 Kit

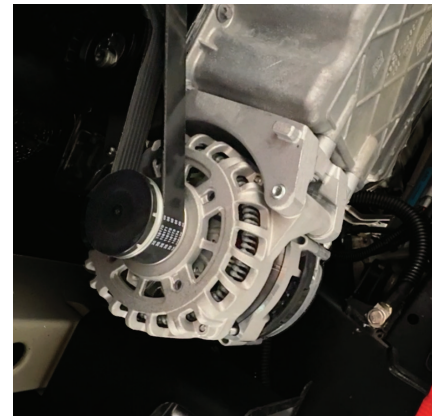
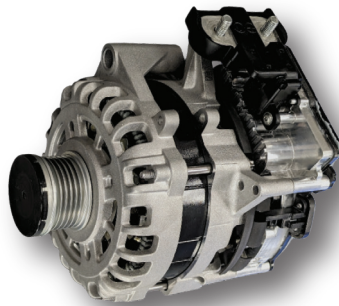
2025 4 Cyl (pic on right)

Prior Year 6 Cyl

prior years 4 Cyl

Clutch Pulley included

Mercedes Compliant



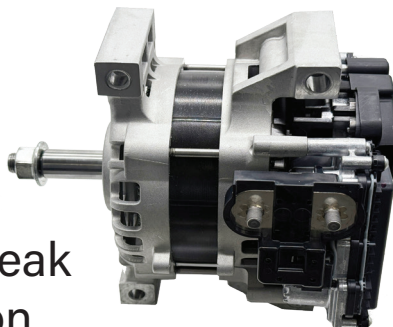
Integrated Pad Mount SHSA4801

Suits Trucks

Higher Output 15kW Peak

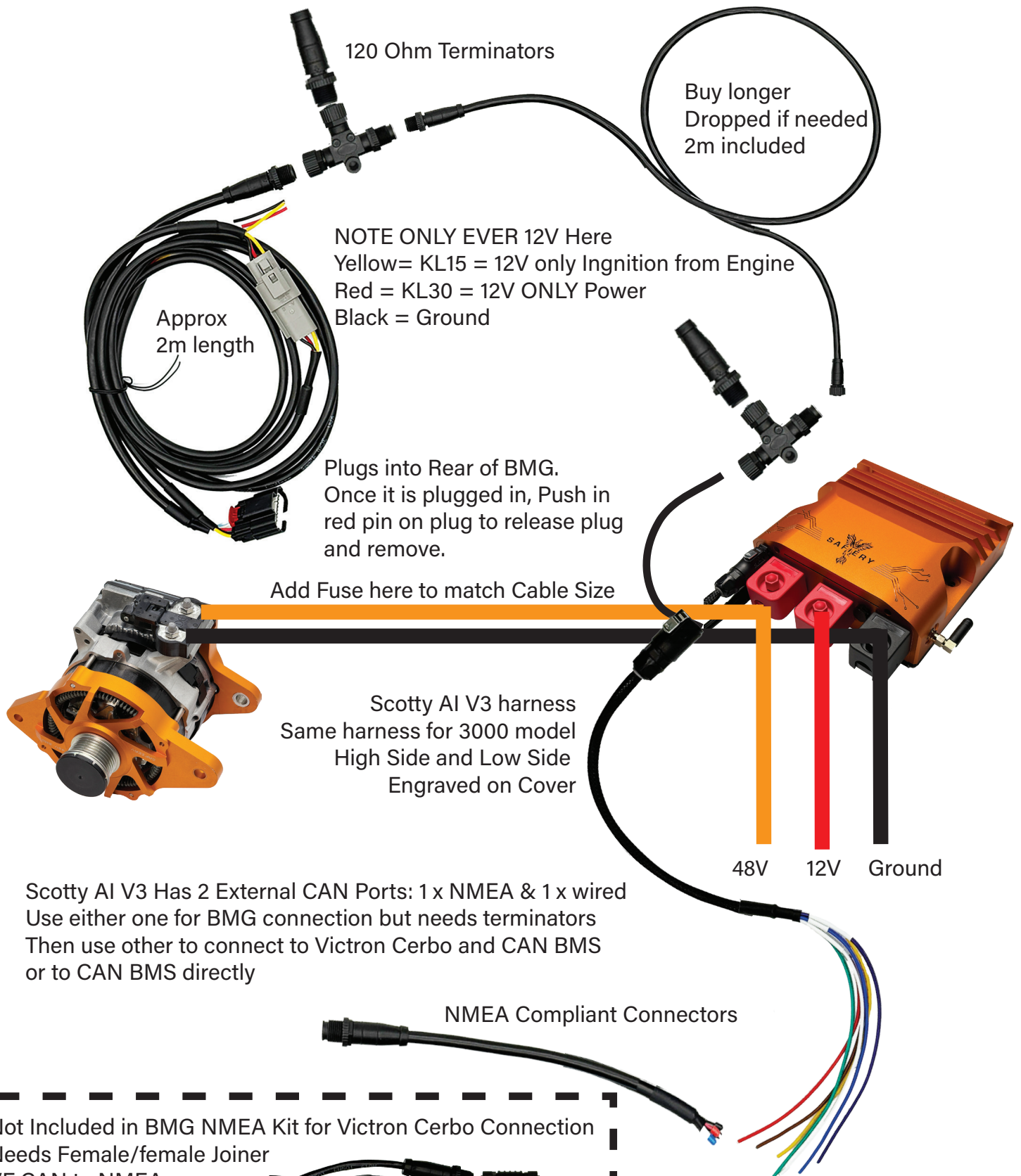
Full bidirectional Option

Pulley not included because of variations



Wiring Diagram

Plus Data Cabling included in BMG NMEA Data Kit Supplied with BMG



Not Included in BMG NMEA Kit for Victron Cerbo Connection
Needs Female/female Joiner
VE.CAN to NMEA

Use second RJ port to
Battery BMS



CAN Hi and CAN Lo Joined
(There is only one NMEA outlet)
So for second CAN it is wired.
Use Feature in for "Stop Charge" if needed.

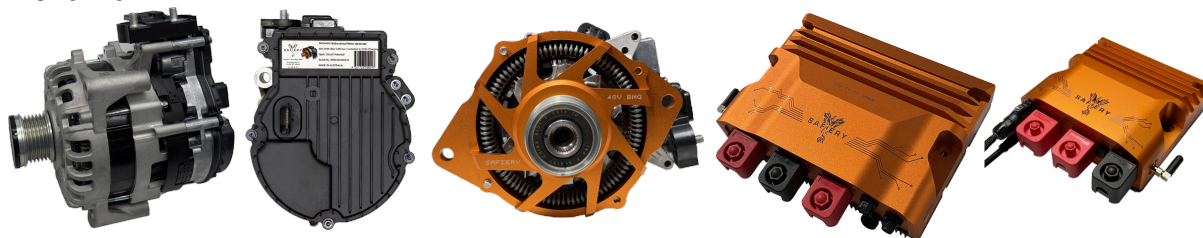
Temp Sensor + and Neg joins at harness
DO NOT PUT Temp -ve to Ground
Enable is redundant with switch
on unit, but can be used as remote.

48V Bidirectional Motor Generator (BMG) Operating Manual

Version 3.1

Table of Contents

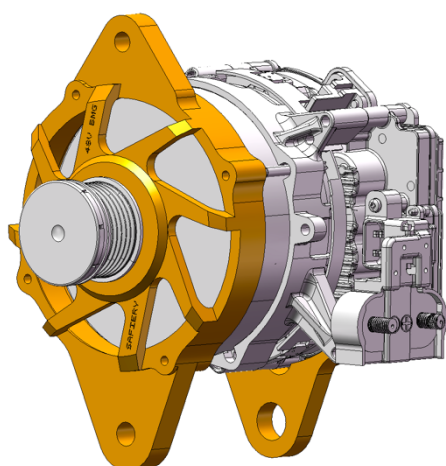
1 Overview



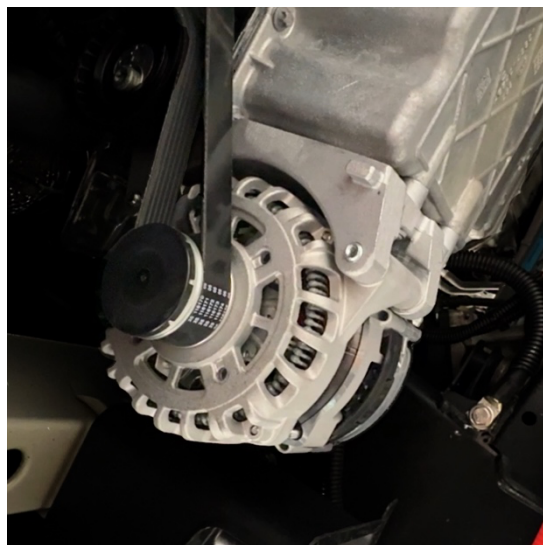
.....	4
Safier BMG System:	5
Onan 10kW Generator:	5
Asymmetric dual three-phase stator design that gives redundancy and high power	6
.....	6
Hybrid Excitation Technology that gives precise control and high power at idle...	6
Offer unique advantages when operated as DC generators, combining the benefits of both permanent magnet (PM) and wound-field excitation.	6
.....	6
Hairpin Windings that significant increase power density	6
Space Vector Pulse Width Modulation	7
Inverter with AEC Q101/Q200 Certification	7
Comparison: Safier BMG System vs Alternators	8
.....	8
Victron Integration	9
2 System Setup	9
2.1 Product description	9
2.2 System architecture	10
2.3 Electrical interface	11
2.4 Mechanical interface	12
2.5 Safety	12
Product Parameters	13
3.1 BMG meets the following operating conditions and parameters:.....	13
3.2 Performance curve	14
3.3 Charge current limit curve.....	14
4 How it Works	14

4.1 Wake Up	14
4.2 Power On	14
4.3 Idle Mode	14
4.4 Generator Mode	15
4.5 Error	15
4.6 Warm-up Mode	15
4.7 Power Down.....	15
4.8 Shut Down.....	15
5 Scotty AI	16
Scotty AI is recognized in the Victron Device List.	16
However, if using Victron Lithium batteries the Charge Current Limit and Discharge current limit are not read as these parameters are not support by NMEA.	16
So still connect Scotty AI and BMG to the VE.CAN but set the battery as a non-CAN battery.	16
There will be NO DIFFERENCE to the charging rate as we have te algorithms for speed of charging set exactly the same whether on CAN or Not.	16
Then Set the Battery Charging Parameters of Bulk, absorption time and Float voltages for the 48V Charging. Even if the batteries are on CAN always set these values as they are a fall back when self healing if there is a CAN error on the network.	16
With Scotty AI connected to the 12V or 24V Alternator (Highly recommended), you still need to perform the AI driven “Auto-tuning”. (See Scotty AI Manual for that)	16
Then Once Auto-tuning is complete, go to next step on following page:	16
BMG “Setup” Mode on Scotty AI Tuning Page	17

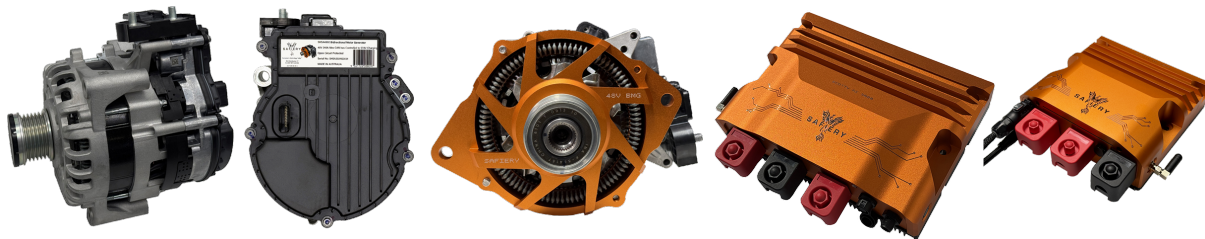
New Volvo Mount Available End of July 2025



BMG Mounted on 2025 4Cyl Sprinter



1 Overview



This Manual applies to claw-pole dual three-phase air-cooled Bidirectional Motor Generators, with motor and inverter integrated and a connected Scotty AI. As the name implies, these can operate as a motor or a Generator.

The Key differences between this technology and traditional Alternator (with remote field regulators) is:

- Asymmetric dual three-phase stator design that gives redundancy and high power
- Hybrid Excitation Technology that gives precise control and high power at idle.
- Hairpin Windings that significant increase power density
- Space Vector Pulse Width Modulation Control capture torque and loading on engine.
- Inverter with AEC Q101/Q200 Certification rather than diodes to convert AC to DC power

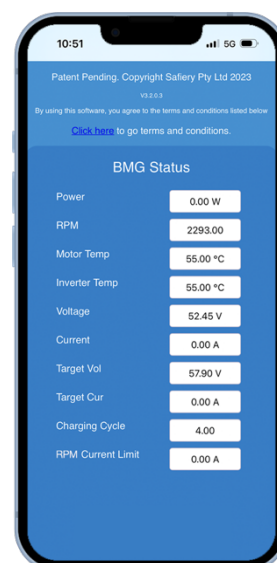
The result is a premium DC generator with exceptional power quality, reliability, and operational flexibility. The benefits in performance, especially for critical DC power applications, are substantial. The high power density and the dual winding system provides significant operational advantages.

The Key Difference between using Scotty AI to control the BMG compared to a Remote Regulator (Balmar, Wakespeed, Zeus, MG Energy) is the following:

- Scotty AI is 100% Digital CAN Control compared to Analog Field Current with others.
- Scotty AI reads the generator torque and ensures that power stops immediately if engine appears overloaded. This is particularly important in small marine 30hp / 40hp.
- Scotty AI prohibits 100% a load dump scenario should the 48V battery BMS relay open and the stop charge function is either too slow or not working correctly.
- Scotty AI maximises the power at idle up to 5,000W when the DC DC is also connected to the 12V alternator and arbitrages the best power combination between the two power sources while maintaining acceptable alternator and inverter temperatures. This is especially import during solar backup when idling the engine.

The BMG Power is seen as an “alternator” on the Victron Cerbo GX display as well as the Safier App.

BMG	Scotty AI	48V Lithium
	Master Controller	
	Reads from any Lithium Bank: CAN if available, Voltage otherwise Has wire-in stop charge	Max 58V Min 40V
RPM Torque Temperature Power	Reads BMG RPM, Motor/Inverter temp. Sets Power limit calculated using AI of the max power the connected engine can deliver at the current RPM Adjust Max Power based on Inverter temperature and motor temperature.	
	Sends Power instruction to BMG of Voltage Setpoint and Current Setpoint to charge Lithium Bank that is within the Power Limit Calculated above.	Voltage Current



Comparison to Gensets

Safiery BMG System:

- Ultra-compact: 95% smaller and lighter than traditional genset
- Integrated solution: Uses existing vehicle engine, no separate generator engine
- Redundancy: Works alongside factory alternator, multiple charging configurations
- Efficiency: High efficiency permanent magnet technology (90% motor, 94% inverter)
- Versatility: Can charge multiple battery banks simultaneously (12V/24V/48V)
- Smart control: AI-driven protection and optimization via Scotty AI V3
- No additional fuel consumption: Uses vehicle's existing engine

Onan 10kW Generator:

- Higher continuous power: Full 10kW continuous output in all conditions
- Independent operation: Can run separately from vehicle engine
- Proven technology: Traditional, well-understood AC generator technology
- Standard AC output: Direct 120/240V AC without conversion but poor efficiency charging DC Lithium Batteries.



Understanding the Core Technology of the BMG

Asymmetric dual three-phase stator design that gives redundancy and high power

Two separate three-phase windings in the same stator in an Asymmetric arrangement: Windings are shifted by 30° electrical (not the symmetric 60°). Creates a 12-pulse system when rectified to DC.

- **12-pulse rectification:** Dramatically reduces output ripple
- **Harmonic cancellation:** 5th, 7th harmonics eliminated
- **Redundancy:** Can operate on one winding if other fails
- **50% power available** during single-winding fault
- **Fault isolation:** Windings magnetically coupled but electrically separate
- **Continued operation:** Critical for mission-critical applications
- **Distributed losses:** Heat spread across more conductors
- 30-40% better heat dissipation than single winding
- Lower hot-spot temperatures: Extended insulation life
- **Independent cooling paths:** Better coolant flow options
 - **Reduced torque ripple:** 3.4%
 - **Lower vibration:** Smoother operation, less mechanical stress
 - **Reduced bearing loads:** More uniform force distribution
 - **Quieter operation:** Less acoustic noise

Hybrid Excitation Technology that gives precise control and high power at idle.

Offer unique advantages when operated as DC generators, combining the benefits of both permanent magnet (PM) and wound-field excitation.

- **Wide voltage regulation range:** voltage from 50% to 150% of nominal
- **Precise voltage control:** $\pm 0.5\%$ regulation
- **Load-independent regulation:** Maintains stable voltage across varying loads
- **Higher efficiency at partial loads:** Field weakening reduces iron losses when full voltage isn't needed
- **Extended speed range:** Effective operation from 20% to 200% of rated speed
- **Low-speed performance:** Strong power generation even at low RPM
- **Overload capability:** Can boost field for short-term 150-200% overload
- **Lower ripple voltage:** Hybrid excitation provides smoother field distribution
- **Controlled shutdown:** Can reduce field to zero for safe maintenance
- **Redundant excitation:** Can operate on PMs alone if field winding fails
- **Short-circuit limiting:** Field control provides inherent current limiting

Hairpin Windings that significant increase power density

- Excellent slot fill despite dual windings
- Superior thermal coupling to cooling system
- Precise manufacturing enables tight tolerances
- Lower resistance maximizes efficiency gains
- Reliability: MTBF increased 3-5X
- Cost: 20-30% higher initial cost
- Voltage regulation: $\pm 0.5\%$ vs. $\pm 2\%$
- Efficiency gain: 2-4% improvement
- Power density: 10-15% reduction (due to extra windings)
- Ripple frequency: 12× fundamental vs. 6×
- Ripple amplitude: 75% reduction
- EMI: Significantly reduced
- DC filter size: 60-80% smaller

Space Vector Pulse Width Modulation

- The three-phase system is transformed into a two-dimensional space vector using Clarke transformation ($\alpha\beta$ coordinates)
- Eight possible switching states create six active vectors and two zero vectors
- The reference voltage vector is synthesized by time-averaging adjacent vectors
- Provides 15.47% higher DC bus utilization compared to sinusoidal PWM
- Maximum Power Point Tracking (MPPT): SVPWM enables precise speed control to maintain optimal tip-speed ratio in wind applications
- Field Weakening: Extends operating speed range by controlling d-axis current
- Unity Power Factor Control: Minimizes reactive power for maximum efficiency
- Outer Loop: Speed or power control generating torque reference
- Inner Loop: Current control in dq reference frame
- SVPWM Block: Converts dq voltage commands to switching signals
- Higher Efficiency: Better DC bus utilization means lower current for same power
- Reduced Torque Ripple: Smoother operation, important for mechanical stress
- Lower Harmonics: Cleaner power generation, easier filtering
- Flexible Control: Easy integration with field-oriented control (FOC)

Inverter with AEC Q101/Q200 Certification

- High Temperature Operating Life (HTOL): 1000 hours at max junction temperature
- Temperature Cycling: -65°C to +150°C, 1000 cycles minimum
- Autoclave/HAST: 96-264 hours of accelerated moisture testing
- Temperature Humidity Bias (THB): 85°C/85% RH for 1000 hours
- Power Temperature Cycling: 1000 cycles with device powered
- Mechanical Shock: 1500G, 0.5ms duration
- Variable Frequency Vibration: 20-2000Hz
- Wire Bond Pull/Shear: Tests bond integrity
- Die Shear: Ensures proper die attachment
- ESD testing: Human Body Model (HBM) and Charged Device Model (CDM)
- Temperature Cycling: -55°C to +125°C (Grade 1), 1000 cycles
- Biased Humidity: 85°C/85% RH, 1000 hours with rated voltage
- Operational Life: 1000 hours at max ratings
- Mechanical Shock: 1500G for chip components
- Vibration: 10-2000Hz, 20G acceleration
- Board Flex: 2mm deflection for SMD components
- Terminal Strength: Pull/push/torque tests
- Solderability: After aging and stress
- Parametric shifts after each stress test
- Surge/pulse capability testing
- Flammability testing
- Solvent resistance
- Grade 0: -50°C to +150°C (under hood)
- Grade 1: -40°C to +125°C (engine compartment)
- Grade 2: -40°C to +105°C (cabin hot spots))

Comparison: Safiery BMG System vs Alternators

Comparison when fitted to 2025 Mercedes Benz Sprinter V6	Safiery Bidirectional Motor Generator and Scotty AI V3	APS130*	APS 160*	Nations 8292HPX-100*
Alternator/ Motor Efficiency	90%	Alternators when hot around 50% efficiency		
Inverter Fitted and its Efficiency	94% (Net 85%)	Uses Diodes which are low efficiency and External Field Current Regulator		
Estimated Power Output at Engine Idle	5000W	Small – 300W	None	Small – 800W
Reduces Power when taking off from idle to comply with Mercedes Benz	Yes Reduces from idle power to 2500W as vehicle accelerates from idle.	Small power anyway	Small power anyway	Small power anyway
Estimated Power cruising speed 1800 engine RPM	8000W	6000W	5000W	6000W
Maximum Output	11000W	6000W	7400W	6000W
Patented Auto-tuning	Yes	No		
Limp Home Mode if CAN connection lost	Yes Up to 4kW	Yes Power level not published		
Multipoint temperature Monitoring	4 temperature measurements	1 temperature measurement		
Bidirectional 48-12-48 included	Yes at 1500W or 3000W at 12V	Requires separate DC DC		
Isolated Negative	Yes	No.		

Diodes for AC > DC



63% Efficient When Cold
Old School Alternator

Efficiency at 23°C 63% typical

200-300W at Idle

Limited Torque Control

6.5kW Max Power

5-6kW Continuous

Digital Inverter AC > DC



85% Efficiency When Hot
Power of many rare earth magnets

2000W at Idle

Full torque Control

10kW Max Power

8kW Continuous

Victron Integration

If you are running a Victron Cerbo GX or Ekrano GX then the BMG appears as an alternator on the Left hand side (the power-in side) of the new GX display. You need Version 3.63 or later running. In the pic below, two units connected as "Master" and "Slave" and showing 17kW as alternator. The battery charging is 16kW because 1kw is going out on the 24V DC loads.



2 System Setup

2.1 Product description

This BMG generator consists of 2 basic parts, a claw-pole permanent magnet generator/motor and an inverter.

The two parts are fastened together by screws and cannot work separately.

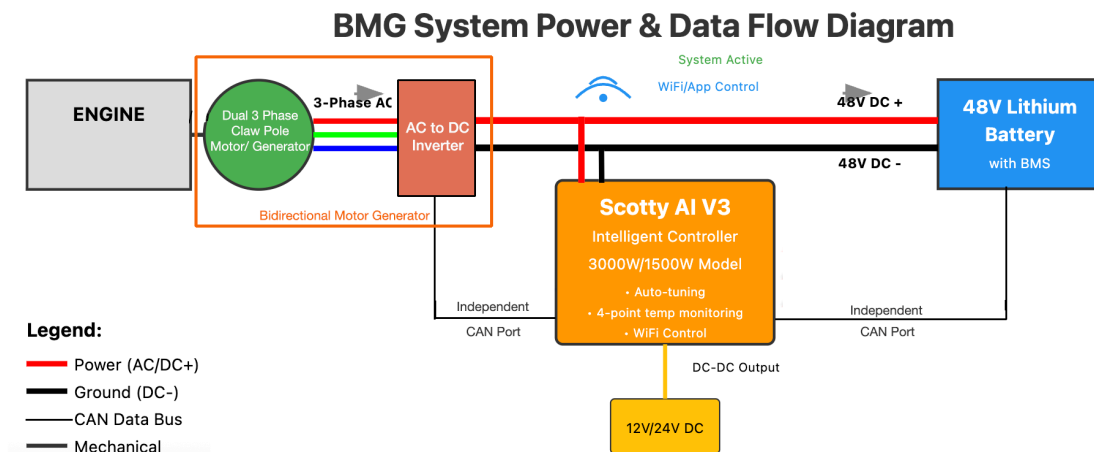
There are 2 Models and 3 mounts for the Second Model

1. SHSA4801 is a Pad Mount Unit capable of a Peak of 300A at 48V
2. SHSA4802 comes in three mounts currently:
 - Sprinter Mount suitable for
 - N62 Mercedes Benz Mounting on 6cyl Diesel
 - Mount on 4Cyl Diesel up to latest 2025 Model:
 - Sprinter Mount for both 4Cl and 6Cyl Engines
 - J180 Mount for Yanmar Marine Engines
 - Volvo Mount for Marine Engines from D2 to D11

An over-running auto clutch pulley is standard on the SHSA802 Model.

Safieri can supply genuine Mercedes Benz Kits for mounting to the factor supplied second "alternator" mounting position.

2.2 System Wiring Diagram and System Architecture



BMG	Scotty AI	48V Lithium Bank
	Master Controller	
	Reads from any Lithium Bank: CAN if available, Voltage otherwise Has wire-in stop charge	Max 58V Min 40V
RPM Torque Temperature Power	Reads from BMG RPM, Motor temp and Inverter temp Sets Power limit calculated using AI of the max power the connected engine can deliver at the current RPM Adjust Max Power based on Inverter temperature and motor temperature.	
	Sends Power instruction to BMG of Voltage Setpoint and Current Setpoint to charge Lithium Bank that is within the Power Limit Calculated above.	Voltage Current

- The inverter integrates a control unit and communicates with Scotty AI via a dedicated CAN port. This CAN communication is kept separate from other CAN communication lines.
- The BMG is attached to the engine directly or via a bracket and connected to the engine crankshaft pulley via serpentine belt. The BMG integrates 48V positive and negative terminals (B+/B-), connects to the positive and negative terminals of the 48V battery. Other 48V loads can be connected on the battery side and supply power directly.
- Some battery packs may require a pre-charge function to avoid damage to the components caused by the voltage shock during the 48V power-on process.
- The 48V circuit also connects to Scotty AI either on the BMG side or the battery side. Scotty AI then delivers 12V or 24V through the integrated DC DC.
- BMG microprocessor and the motor field control needs to be connected to a 12V supply. DO NOT CONNECT 48V or 24V to the KL15 or KL30 terminals. 12V ONLY.**

2.3 Electrical interface

BMG has 2 electrical interfaces, a low voltage 12V interface and a 48V interface. The pin outs are shown below, using Molex's 8 pin connector.

PIN outs at Connector to BMG. This is pre-wired by Safiery and split into a NMEA/Black and Red wires for 12V Power for KL15 and KL30.

NUMBER	ALOCATION	CHARACTERISTICS
1	KL15	8V-16V, Max.50mA
2	GND	
3	KL30	8V-16V, Max.3A
4	NC	
5	A CANH	6V-18V, Max. 500mA
6	A CANL	
7	B CANH	For development Use
8	B CANL	For development Use

- There is no CAN termination resistor by default. It is inbuilt in the connecting cable to Scotty AI.
- The 48V power terminals of BMG consist of two M8 screws and are marked with +/- symbols near the terminals to indicate positive and negative poles. The tightening torque of the nuts should be controlled within the range of 15-19Nm pm.
- It is important to pay attention to the correct connection of the positive and negative harnesses. BMG does not have reverse polarity protection, and a reverse connection will damage the BMG.
- The same applies to Scotty AI.
- It is recommended to add a Mega fuse on the connecting 48V Positive Cable between the positive terminals of BMG generator and 48V battery (close to the battery terminal), to protect the components parts and harness in the event of a short circuit.
- The Fuse size depends on the cable size chosen.
- The Cable Size depends on the Cable run length.
- Typical values are a 5m cable run so 35mm² > 200A Fuse or 50mm²>300A Fuse

2.4 Mechanical interface

The BMG must be tensioned properly to ensure that the maximum hub-load on Pulley Block is less than 2000N. A mounting arm may be used to fix the J180 Mount. Pay attention to how the tensioning adjustment is made to avoid belt slip.

The mounting bracket of the motor should provide enough stiffness to ensure that the vibration excitation on the mounting arms of the motor does not exceed the limits in the table below.

Sinusoidal vibration

Frequency [Hz]	Amplitude of acceleration (Perpendicular to the shaft) [m/s ²]	Amplitude of acceleration (Parallel to the shaft) [m/s ²]
10	25	25
100	100	50
200	20	50
800	50	25

Random vibration

Frequency [Hz]	PSD (Perpendicular to the shaft) [(m/s ²) ² /Hz]	PSD (Parallel to the shaft) [(m/s ²) ² /Hz]
10	10	5
100	10	5
150	0.1	0.05
700	0.1	0.05
800	10	5
2000	10	5
	Maximal acceleration RMS ≤ 181 m/s ²	Maximal acceleration RMS ≤ 90.5 m/s ²

2.5 Safety

BMG has voltage above 36V AC inside, so the surface is protected by an insulated cover to isolate the internal high voltage from direct contact with the human body. If the insulation cover is found to be damaged, stop using BMG immediately. When BMG is working, direct contact with the live part is not possible.

BMG is an air-cooled motor with integrated high-speed rotating fans, and direct contact may cause damage to the human body or the BMG. When the motor is running, it is forbidden to use fingers or other foreign objects to penetrate the inside of the motor.

BMG generates a lot of heat when working, which increases the temperature of the motor body and the surrounding environment. Do not approach or contact directly until the motor is sufficiently cooled, otherwise it will cause human body damage.

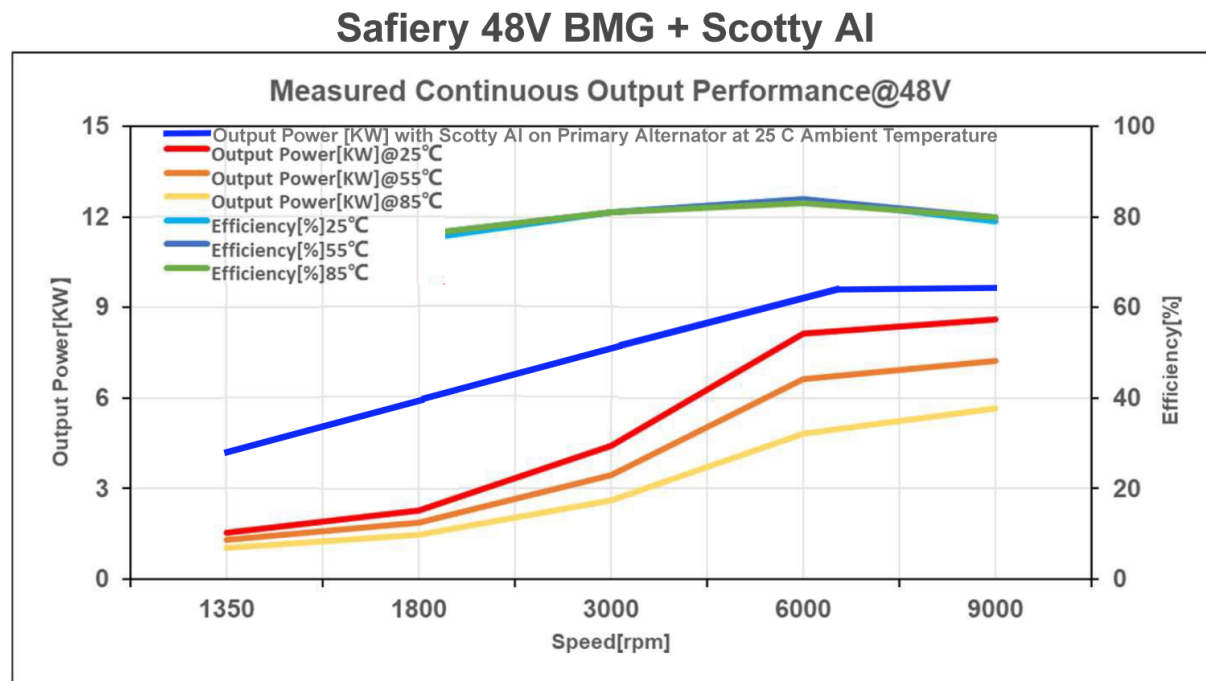
Product Parameters

3.1 BMG meets the following operating conditions and parameters:

Items	Parameters
Nominal Operating temperature	-30C to 105C
Motor type	Claw pole machine, Dual 3 Phase Hairpin
Cooling method	Air
Motor diameter	150mm
Motor length	155mm (without shaft and pulley)
Weight	7.3kg (without OAP)
Rotor Inertial	39kgm ²
Max operational speed	16000 rpm
Spin Direction	Clockwise with Over run clutch pulley.
Nominal Operating Voltage	40V~57.9V
Generator performance	Peak:10kW @>5000rpm, 105C, 20s> Continuous: 5kW @>6000rpm, 105C
Response time	150ms without Pre-flux
Voltage ripple	6V, @15HZ~30KHZ &> 2V, @30KHZ~200KHZ
Voltage accuracy	+0.5V
Current accuracy	0.5
Speed accuracy	5RPM
Torque accuracy	0.05Nm
Over-Voltage threshold	60V
Under-voltage threshold	38V
Efficiency	Peak: 85%
Motor overall protection	Motor: IP25> Inverter: IP6K9K (with mated harness connector)
Hi-pot test (without inverter)	1000V DC for 1s: > Between two three-phase > Between phases and housing > Between phases and stator core

3.2 Performance curve

The peak performance curve and working conditions of the motor are shown as follows.



3.3 Charge current limit curve

This is set on the Scotty AI App

4 How it Works

4.1 Wake Up

The BMG will be wake up after receiving the 12V + KL15 signal and start CAN communication.

4.2 Power On

The 48V BMG will initialize after wake up within 200ms including initialization of all actuator and sensor control. Directly after the initialization the BMG will:

- start CAN communication with Scotty AI.
- start to perform initial diagnostic and safety checks.
- If any errors happened, the system will transit to error state to Scotty AI App.
- If KL15 signal was changed from ON/START to OFF, the system will start to power down.

4.3 Idle Mode

This mode is typically active:

- after system initialization, during engine idle or when a major fault occurs.
- This mode is considered as a passive mode and is used during waiting phase.
- In this state, the rotor is freewheeling and the magnetic field of the rotor is not energized.
- Only self-measurements, communication and diagnostics are available.

4.4 Generator Mode

This mode is:

- The major working mode of BMG.
 - Generator Power is set in this mode by Scotty AI based on 3 variables:
 - Engine RPM
 - Inverter and Motor temperature
 - Battery SOC%
 - BMG will stop generating power when and one of these is at it's limit.
 - Maximal and minimal rotation speed are also set for generator mode.
 - BMG will not generate any power when its speed is exceeding speed range.
-

4.5 Error

BMG will activate this state in most failure cases and set motor as freewheeling state. BMG will not react to any system command until failure is healed and or reset.

There are different self-healing conditions depending on the failure condition:

- New ignition cycle ²⁰
 - Error set condition is not active
 - Fault memory clear is executed
-

4.6 Warm-up Mode

Scotty AI will always control a “warm-up” mode after these conditions are met for more than 30 secs:

- BMG speed above 1050rpm ²⁵
 - BMG 48V terminal voltage higher than 38V ²⁶
-

4.7 Power Down

- This state is the first-step in the shutdown process of the system.
 - When 48V system and KL15 are off, the magnetic field of the rotor is de-energized and set motor into freewheeling state.
 - BMG controller will start post-run.
 - During this state, BMG can transit back to operation state if engine conditions change.
-

4.8 Shut Down

- BMG will get into shut down state when the post run is finished.
 - The controller will sleep.
 - Communication and internal diagnosis will stop.
-

5 Scotty AI

Scotty AI is recognized in the Victron Device List.

However, if using Victron Lithium batteries the Charge Current Limit and Discharge current limit are not read as these parameters are not support by NMEA.

So still connect Scotty AI and BMG to the VE.CAN but set the battery as a non-CAN battery.

There will be NO DIFFERENCE to the charging rate as we have te algorithms for speed of charging set exactly the same whether on CAN or Not.

Then Set the Battery Charging Parameters of Bulk, absorption time and Float voltages for the 48V Charging. Even if the batteries are on CAN always set these values as they are a fall back when self healing if there is a CAN error on the network.

With Scotty AI connected to the 12V or 24V Alternator (Highly recommended), you still need to perform the AI driven “Auto-tuning”. (See Scotty AI Manual for that)

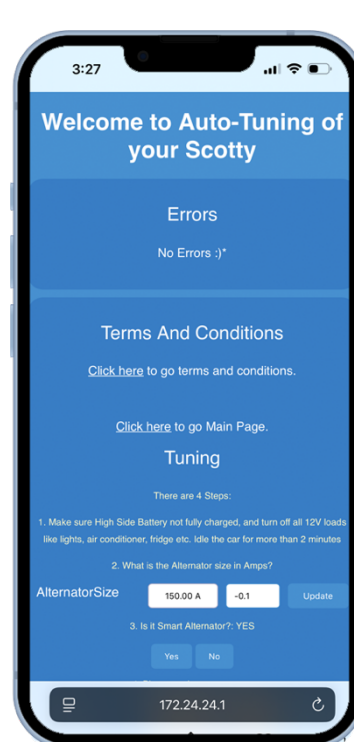
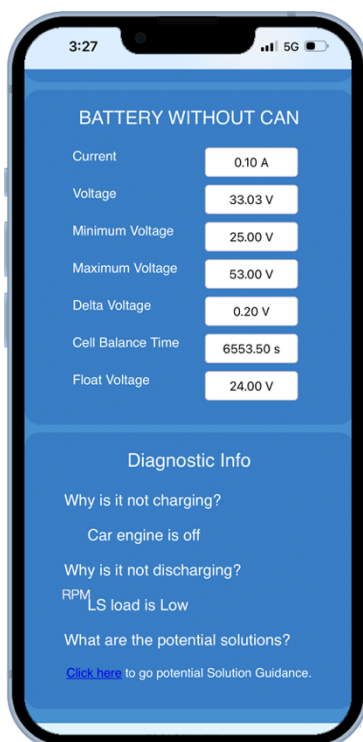
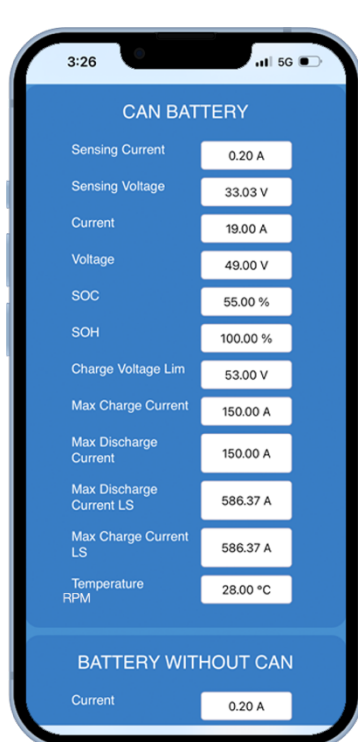
Then Once Auto-tuning is complete, go to next step on following page:

Firmware Update

Rescan

You can use this page to update the firmware of devices connected to your GX device. For detailed instructions about the update process visit: [Remote Firmware Update Manual](#).

Device description	Product Id	Serial Number	Installed	Latest
Safier Scotty		SN0012345	N/A	N/A
BlueSolar Charger MPPT 100/30 rev2	A04A	HQ1602YZM7Y	v1.64	v1.64
Cerbo GX MK2	C012	HQ2442FDV7P	v3.55	v3.55
Quattro 48/15000/200-2x100	2656	Unknown	v556	v556



BMG “Setup” Mode on Scotty AI Tuning Page

The User sets the BMG operating parameters on the “tuning page” of the Scotty AI App.

Pay Attention to this step or you won't see any power!

1. Set the maximum charge voltage
2. Set the max Charge Current that the batteries will take and this is also the maximum you are setting for the BMG. When commissioning the first time, set this at about half the final number you will use. This is to be sure the belt tension, position is all running smoothly before you “Crank Up” the power.
3. Set the Float Voltage of the Lithium bank
4. Lithium batteries have a cell balancing time or absorption time, set that in seconds. Really is it more than 2 hours. We typically use 1 hour = 3600 seconds.
5. BMG rpm0 is the RPM speed of the BMG that you want the power to start at. This NOT the engine speed. Typical pulley ratios are close to 3:1 so set a number 3 x the engine idle speed.
6. BMGrpm1 is the top BMG speed you set for maximum power
7. BMGCur0 is the current you set at the minimum BMGrpm0 speed. Power is Current x Voltage.
8. BMGCur1 is the current you set at the maximum BMGrpm1 speed. Power is Current x Voltage.

Scotty AI then ramps the BMG power between these two settings in a smooth and progressive way.

Not Getting the Right Power you expect?

There is a lot happening behind the scenes with Scotty AI and the BMG. We have created a simple and easy way to determine what the issue is if not getting enough power.

On the App home page under “BMG Status” are two calculations of Current:

1. RPM Current Limit is Scotty AI's assessment of the max current possible considering the RPM speed of the BMG. This is the absolute maximum that COULD be delivered right now!
2. The Target Cur is the maximum calculated current possible because of sensor values and the battery SOC%. If this number is less than 1. Above then there are reasons other than max performance holding the BMG back. It could be any of these reasons:
 - Battery State of Charge is high and battery charge acceptance rate is low
 - Inverter temperature is high (Shown on BMG Status page). This will operate up to around 140C. But Scotty AI will start to derate performance at 120C after a timer starts.
 - Motor temperature is high (Shown on BMG Status page). This will operate up to around 140C. But Scotty AI will start to derate performance at 120C after a timer starts
 - Belt is slipping (you will hear it. When this happens the BMG stops, waits about 5mins and restarts.

