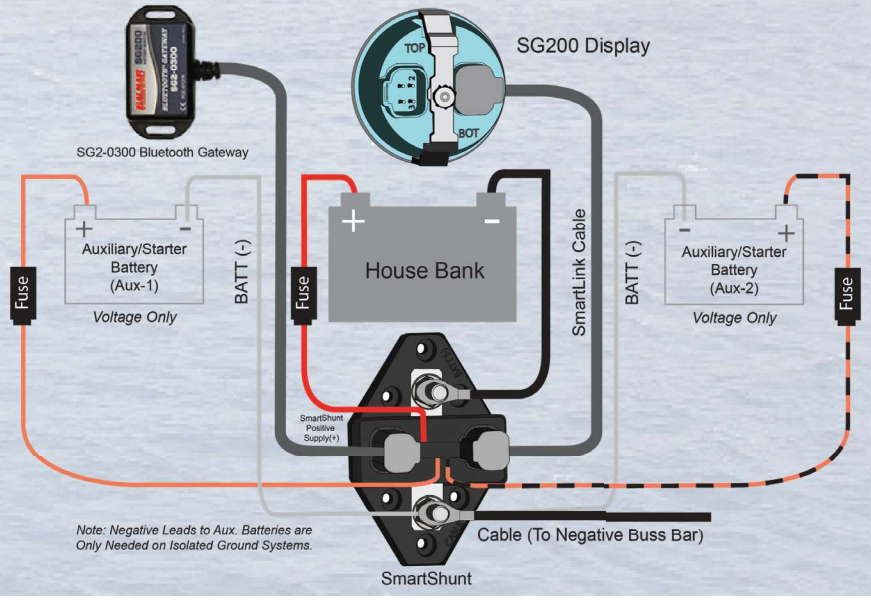
SG200 Battery Monitor

State of Charge (SoC%)	State of Health (SoH%)	Charge/Discharge Amps	Time Remaining
97% accurate display of your battery's State of Charge after learning batteries.	Proprietary self-calibrating algorithm determines how your battery has aged from its original capacity.	Displays the real-time current flowing in or out of your house battery.	Time remaining until empty when discharging, or time remaining until full when charging.



- Shown here is the standard SG200 configuration wiring, including connections for two Aux/Start batteries.
- The SG210 includes the optional Bluetooth® Gateway in one package
- The SG205 includes the Bluetooth® Gateway, but does not include the 2" Color Display and is appropriate for users who want to monitor their batteries exclusively from the Balmar App.

Part Number	Description	Explanation / Includes
SG200	Battery Monitor Kit, 12V-48V	Standard Unit for Initial Purchase: Includes Color Display, SmartShunt, SmartLink Com Cable
SG205		Includes SmartShunt & Bluetooth Gateway Only (No Color Display)
SG210		Includes Color Display, SmartShunt, Smartlink Com Cable, Bluetooth© Gateway
SG230	Battery Monitor Kit, 12V-48V, NMEA 2000	Includes N2K SmartShunt & Adapter Cable, Color Display, Com Cable, Bluetooth© Gateway
SG235		Includes N2K SmartShunt & Adapter Cable, Bluetooth© Gateway Only (No Color Display)
SG2-0100	SmartShunt, SG200, 350A, 12V-48V	Add a SmartShunt for Additional Bank: Includes SmartShunt and SmartLink Com Cable
SG2-0130	SmartShunt, SG230, 350A, 12V-48V	Add a N2K SmartShunt & Adapter Cable to Upgrade an Existing SG200 System
SG2-0200	Color Display, SG200, 2 1/16"	Add a Color Display to an existing SmartLink Network
SG2-0300	Gateway, SG200, Bluetooth®	Optional 39" Bluetooth® Gateway for Smartphone App
SG2-0400	Com Cable, SG200, 10m	Optional SmartLink Com Cable (10 meter) for Extensions and MC-618 Connection
SG2-0402	Mounting Plate, SG200	Mounting Adapter from SmartGauge™ to SG200 Display
SG2-0403	Com Cable, SG200, 5m	Optional SmartLink™ Com Cable (5 meter) for Extensions and MC-618 Regulator Connection
SG2-0404	Com Cable, SG200 & MC-618	Optional SmartLink™ Com Cable for MC-618 Regulator Connection, 12"
SG2-0405	Com Cable, SG230, NMEA 2000, 12"	Com Cable, SG230 (N2K) & SG240 (RV-C), M12 (DeviceNet), 12"
SG2-0408	Com Cable, 3-Way Adapter	Com Cable, SmartLink™ Connection Extender

NEW

MC-618 Voltage Regulator

Integration with the SG200 Battery Monitor

- **Monitor Alternator/Regulator Activity from the SG200**
- **Setup Regulator from 2" Color Display or the Balmar App**
- **Advanced Programming from the Smartphone App**
- **All the Same Regulation Features as the MC-614**
- **New Carbon Foam Battery Profile**
- **Improved High Temperature Alternator Control**
- **Protects Lithium Batteries Below Freezing Temperatures**

Balmar has upgraded its legendary MC-614 Voltage Regulator to communicate with the SG200 Battery Monitor! Now you can see how the ***New*** **MC-618 Regulator** is directing your alternator charging activity from either the SG200 2" Color Display and/or the optional Bluetooth® Smartphone App. Basic setup functions can be accomplished from the SG200 Color Display, Balmar App or the traditional on-regulator programming tool. Advanced Programming functions are available from the Balmar App.

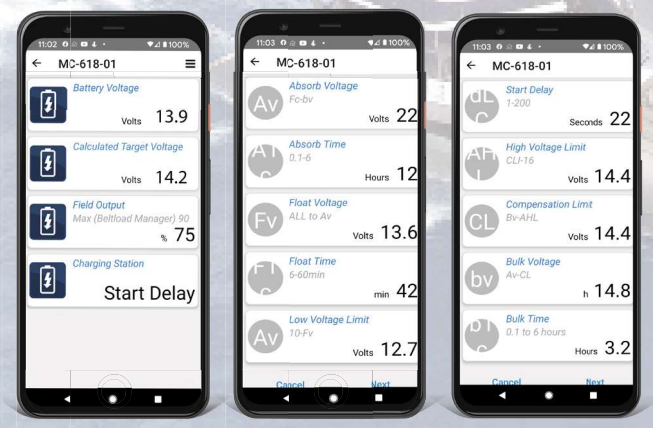
Monitor your Alternator's Performance with Real-Time Data

- **Charging Stage**
- **Compare Actual Voltage against Target Voltage**
- **Monitor Field Output Percentage**
- **Set Maximum Field Percentage**

Add the Optional Bluetooth® Gateway to Enable Advanced Programming on the Balmar App

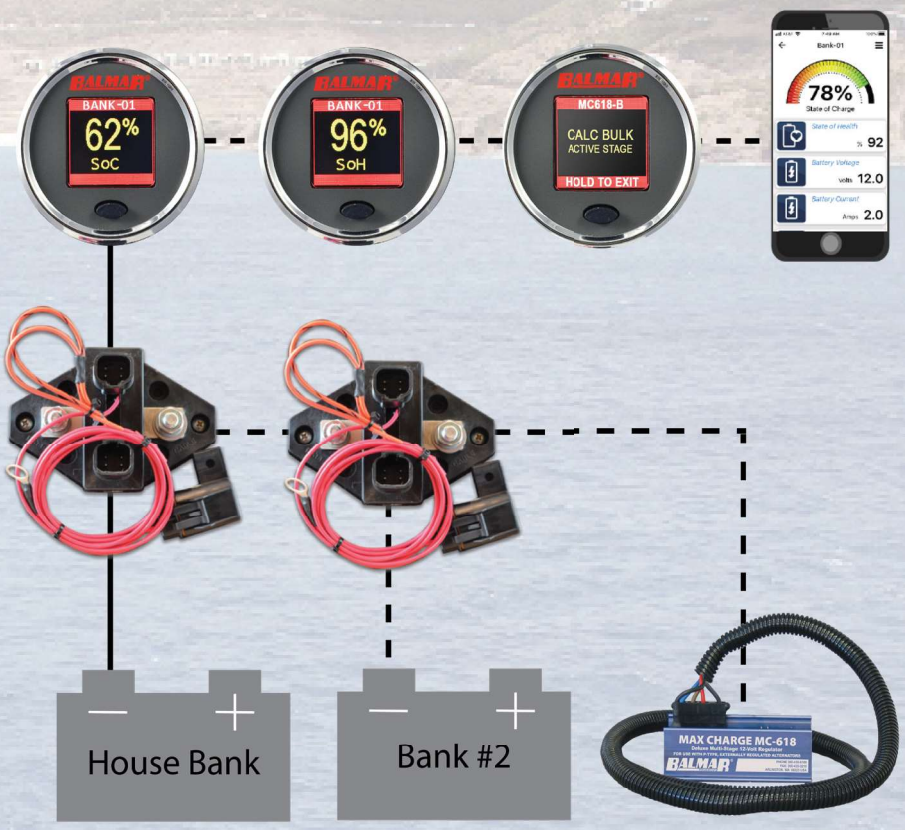
- **Configure ALL Regulator Parameters**
- **Save and Recall Regulator Programs**
- **Monitor Regulator Performance from your Smartphone**
- **Collect and Share Diagnostic Information**

Best of all, the ***New*** **MC-618** is priced the same as the MC-614. Merely purchase a 5M (SG2-0403) or 10M (SG2-0400) data cable to connect to the SmartLink™ Network.



SG200 Battery Monitor and MC-618 Regulator

SmartLink™ Network for Charging and Monitoring



- Build your own charging and battery monitoring network!
- Add Color Displays for viewing data in different locations.
- All charging and battery information can be displayed anywhere on the SmartLink™ Network.
- SG200 Firmware upgrades available via downloads through the Balmar App and Bluetooth® Gateway.
- Dual engine applications are easily supported by connecting both MC-618 regulators to the SmartLink™ Network.
- Add SmartShunts if you have multiple banks.
  - Stern or Bow Thruster Banks
  - House Bank #2

SG200 Specifications

Standard Configuration:	1 Battery Bank per SmartShunt Device 2 Start/Auxiliary Voltage Sense Lines (Up to 32 devices including Displays and SmarShunts can be added to a single network.)	**Display Values:**	State of Charge (SoC%) State of Health (SoH%) Voltage (V) Charge/Discharge Current (A) Time Remaining (Hrs) History, Faults & Alerts (Consult User Manual)
Supply Voltage Range:	8V - 60V DC	**Max Ah Capacity:**	1310 Ah (per SmartShunt)
Average Supply Current:	Display On: 20 mA @12V Sleep Mode: 10 mA @12V	**Communications Cable:**	4 wire, 22 AWG, Shielded 4 pin Deutsch DT Style
SmartShunt Operating Temperature:	-40°C - +85°C (-40°F - +185°F)	**Grounding:**	Negative Battery Connection
SmartShunt Max Current:	600A Instantaneous (10 minutes @ ambient) 350A Continuous (For Higher Currents Consult User Manual)	**SmartShunt Dimensions:**	Length: 4.87” (123.7 mm) Width: 3.34” (84.8 mm) Height: 2.01” (50.9 mm)
Weight:	SmartShunt: 0.62lbs (0.28kg) Color Display: 0.16lbs (0.07kg)	**Color Display Dimensions:**	Bezel Diameter: 2.37” (60 mm) Base Diameter: 2.05” (52 mm) Depth with Cable Attached: 2.75” (70 mm)
Standards Compliance:	CE *EMC Directive 2014/30/EU* *RoHS 2 Directive 2011/65/EU*	**Protection Rating:**	IP65 (Display), IP67 (SmartShunt)

Balmar Voltage Regulation Technology

High output alternators are an important part of your system for battery care, but they are definitely not the only part. Without proper voltage regulation, battery charging can be a slow process, or even worse, an ideal recipe for early battery failure.

All commercial alternators come with an internal rectifier/regulator circuit that:

(1) converts AC current generated by the alternator to DC current, and
(2) fixes the voltage output to a static level – typically 14.2 volts.

There are several deficiencies with internal regulators:

(1) Not all battery technologies want to receive 14.2 volts.
(2) All battery types have an optimal charging "profile", which means they want different voltages and currents at different stages of their charging cycle, as well as variations when battery temperatures change.
(3) Once fully charged, batteries can overheat if they are supplied with continuous current at a fixed charge voltage.

Balmar's patented Max Charge and ARS-5 Voltage Regulators provide a dynamic method for monitoring battery condition and apply the correct level of alternator control (voltage and current) to ensure that your batteries are charged quickly and safely.

During engine operation, Balmar regulators step through the following stages to ensure proper battery charging:

Stage 1: Start Delay – After engine startup, the regulator waits for several seconds before applying field current to the alternator. This allows the engine and belts an opportunity to warm up before the alternator load is applied.

Stage 2: Soft Ramp – The regulator slowly increases field excitation of the alternator to reduce belt stress.

Stage 3: Bulk Charging – The regulator increases field output to the maximum safe level, allowing the alternator to reach maximum amperage output based on the target limits of the battery type being charged. Target voltage ranges from 14.1V to 14.6V depending on the battery type selected (24V bulk charging voltages range from 28.2V to 29.2V). Bulk time is a factory set at 18 minutes, and is fully adjustable in advanced programming mode.

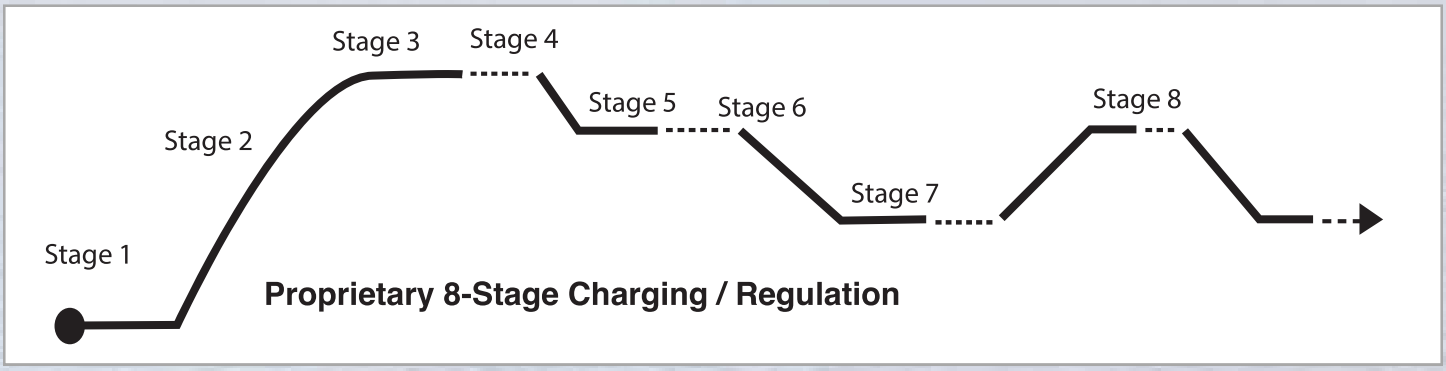
Stage 4: Calculated Bulk - At the end of the set bulk time period, the regulator calculates the state of charging based on the alternators ability to reach and maintain target voltage, and the percentage of field output required to maintain that voltage. This stage will maintain bulk charging until all criteria are met, at which point the regulator will ramp down to absorption voltage.

Stage 5: Absorption Voltage – Typically two tenths of a volt below bulk target voltage, absorption voltage allows the alternator to drive current into the almost fully charged batteries without overcharging. Absorption time is preset at 18 minutes, and is adjustable in the regulator's advanced programming mode.

Stage 6: Calculated Absorption – At the end of the set absorption time period, the regulator calculates the state of charging based on the alternator's ability to reach and maintain the target voltage and the percentage of field output required to maintain that voltage. This stage will maintain the absorption charging voltage until all criteria are met, at which point, the regulator will ramp down to float voltage.

Stage 7: Float Voltage – Typically one (1) volt below bulk target voltage, float voltage allows the alternator to drive current into fully charged batteries sufficient to replace any battery capacity used while under way. Float time is preset at 18 minutes, and is adjustable in the regulator's advanced programming mode.

Stage 8: Calculated Float – At the end of the set float time period, the regulator calculates the state of charging based on the alternator's ability to maintain the target float voltage and the percentage of field output required to maintain that voltage. If all of the calculation criteria are met, the regulator will continue to maintain float voltage. If the calculation indicates that the alternator is failing to maintain battery voltage, the regulator will return to absorption voltage.



Proprietary 8-Stage Charging / Regulation

Additional Features

User-Selectable Preset Battery Programs

Balmar provides multiple charge profiles to ensure optimal charging. Simply select the battery program that matches your battery technology. The Max Charge regulator family contains 8 preset charge profiles, including a new standard program for lithium batteries. The ARS-5 contains 5 preset profiles. See the chart on page 16 for a listing of battery programs.

Advanced Programming Modes

Balmar multi-stage regulators feature a broad range of advanced regulator adjustments. By accessing the advanced programming function, the user can modify charging times and voltages in all stages of charge, adjust start delay times, temperature compensation limits, temperature compensation slopes, and modify set points for alternator over-temperature response.

Alternator and Battery Temperature Sensing and Control

Balmar multi-stage regulators have the ability to automatically correct charging output to ensure that batteries are properly charged regardless of ambient temperature. If battery temperatures exceed safe operating levels, Max Charge and ARS-5 Voltage Regulators will automatically reduce charging outputs to avoid dangerous thermal runaway conditions.

Maximum Field Percentage (Belt Load Management)

Balmar multi-stage regulators can protect the engine and belt by enabling the user to de-rate the alternator's output in small increments by adjusting the Max Field Percentage. Adjustable in 5% increments, the Max Field Percentage reduces the regulator's field pulse bandwidth, thereby reducing load on the drive belt. The Max Field Percentage can also be used to protect the alternator in applications where battery capacity exceeds ideal charging ratios.