The **Weile Enterprises AGS-S03** is an advanced Auto Generator Starting system designed to accurately start and stop virtually any kind of generator based on the ***State Of Charge*** of the battery current being drawn or supplied by hybrid inverters.

Designed for use with **lead carbon** batteries, the device measures up to **250 Amps** at **48 volts** being charged or discharged from the battery with a resolution of 0.125 Amps on a continual basis, and every two seconds calculates the ***State Of Charge*** compensated with the temperature measured on the battery array.

The values are then transmitted via the **AGS-S03's CanBus port** to a hybrid inverter while emulating a ***Pylon type lithium battery*** This enables the hybrid inverter to charge **lead carbon** batteries far more efficiently than relying on the voltage measured at the battery in order to determine when to start and stop charging the battery.

Contents

1 Key Features

The **AGS-S03** has many features which permit it to be used in all kinds of operating environments. The **AGS-S03** need not be connected to a generator, and may be strictly used to calculate the ***State Of Charge*** and echo the calculation to a hybrid inverter.

When the **AGS-S03** is configured to connect to a **WiFi router**, measurements are accumulated and sent to the **Weile Enterprises server** every five minutes such that when a customer logs into their ***Control Panel*** on the server, they're able to view graphical data such as the ***State Of Charge***, Current flow to and from the battery, as well as voltage levels of the battery, etc... on a daily basis.

People logging into the ***Control Panel*** on the server are also able to modify and retrieve the ***configuration parameters*** of their **AGS-S03**

Itemized below are a few of the features the **AGS-S03** has:

1. Supports ***battery capacities*** from **100 to 2000 Amp Hours**, with the ***maximum charge voltage*** adjustable from **48.0 to 62.0 volts**.

2. May be used to activate a ***Cold Weather Kits*** for propane powered generators for adjustable time periods of time ranging from **30 to 120 minutes**.
   Note: this may require that a ***Solid State Relay*** (**SSR**) capable of switching AC loads be connected to the generators AC input for activation of the ***Cold Weather Kit***.

3. **Three independent relays** inside the **AGS-S03** may be used to start and stop virtually any type of generator. Typically only one relay is used for ***Two Wire*** remote start generators, the other two relays are used primarily for ***diesel generators*** and used to activate the ***glow plug*** and ***starter solenoids*** inside the generator. Timing adjustments **(Delay and Activation Times)** for those relays, can easily be made at the **AGS-S03** or from the server.

4. An ***Hour Meter Input*** on the **AGS-S03** senses whether the generator has started and stopped. The ***Polarity*** of this input can be set to either **Active High** or **Active Low** to indicate the generator is running.

   Note: In the event that a generator does not have an ***Hour Meter Output*** signal, **Weile Enterprises** recommends the use of an AC to DC module such as the **IRM-30-12ST model from Mean Well Corporation**, we do not recommend usage of **AC to DC wall adapters**.

5. The **AGS-S03** has a ***40 character display*** used to periodically show its measurements as well as to display its settings when the device is being manually configured via the ***push button / rotary switch***.

6. Housed in a sleek extruded aluminum enclosure, the **AGS-S03** meets **CSA Schedule 'B' Approval**.

7. ***Two push button switches*** are used to display communications relevant parameters as well as to manually start or stop a generator attached to the device.

8. The **AGS-S03** has a built in ***WiFi Radio*** with an external antenna port which may be used to communicate with the **Weile Enterprises Server** through a ***WiFi Router*** at the customers site.

9. All configuration settings of the **AGS-S03** may be altered by the customer when logging into the ***Control Panel*** on the server. The server is also used to send out ***Email Messages*** to the customer in the event of a ***Fault Condition*** such as the generator failing to start, etc.

10. Periodically **Weile Enterprises** comes out with program updates for the **AGS-S03**, as such the operator simply puts their system into **bypass mode**, and selects ***Firmware Update*** detailed in the System Configuration section of this document.

11. When batteries are replaced, added, removed, or when the **AGS-S03** is first installed, a ***State Of Charge Re-calibration*** will need to be completed in order for the **AGS-S03** to accurately calculate the ***State Of Charge***. This re-calibration process can be completed either on-site or from the server. Once the re-calibration has been completed, the ***State Of Charge*** is locked into a battery backed section of the devices memory.

2 Cabinet

2.1 Front Face Plate

Centered and towards the top sits a 40 character display with a viewing area of approximately **78 mm wide by 17 mm in height**.
Two momentary contact switches mounted under the display have the following functions:

- The switch on the **left side** will manually start or stop a generator when the system is **Generator Attached** and in the **Idle State, the Warm Up State, or the Charger Running State**, The switch is ignored when the system is in any other state.
  When the switch is used to start the generator the **AGS-S03** ***bypasses*** most tests it would normally be doing once the generator starts and goes into the **Charger Running State**. Likewise if the switch is pressed while the system is in the Charger Running State, the **AGS-S03** will stop the generator and go into the **Generator Cool Down State**.

- The switch on the right hand side when pressed will display the **AGS-S03's Serial Number and its version number** on the top row of the display. The **WiFi radios MAC Address** will be displayed on the bottom line of the display, such that installations using firewalls will be able to set them up in order for the **AGS-S03** to communicate with the server.
  If the server is online the top line of the display will display **Server is Online**, while the bottom line of the display will display the **I.P. Address** the **AGS-S03** uses.
  In the event that the **AGS-S03** is unable to communicate with the server, a message of **Server is Offline** will be displayed on the top line with nothing being displayed on the bottom line.

Five indicators to the left of the display are used to display the following (from top to bottom):

Charging	**System is in the Charger Running State**
Warm Up	**System is in the Warm Up State**
Comm LED	**Communications Indicator**
Fault LED	**System is in the Error State**
Power	**Indicates the system is on**

To the right hand side of the display sits a rotary push-button switch, that when pressed will put the **AGS-S03** into **Configuration Setup Mode**, as described in the **Configuration Setup** section of this document.

Note: Whenever a push button switch is pressed, the Comm LED will briefly illuminate until the switch is released. In the event that a switch is pressed longer than ten seconds the system will go into the Error State and display *Stuck Switch Condition* as being the cause of the fault.

2.2 Left Panel

On the left side of the cabinets end panel, to the left there's a 16 position **DC ONLY** receptor in place to connect all wiring at the installation to a generator, and to the inverters battery (Ground Connection). Each pin of this connector supports wire gauges from **16 to 28 AWG**. Each pin has the following purpose:

Pin 1	**Analog input Max 30.15 volts**	**Grid Voltage Monitor**
Pin 2	**Ground**	
Pin 3	**Ground**	
Pin 4	**Ground**	
Pin 5	**Temperature Sensor Data**	**Digital I/O Line**
Pin 6	**Analog input Max 30.15 volts**	**RFU**
Pin 7	**Analog input Max 30.42 volts**	**Generator Battery Voltage**
Pin 8	**Analog input Max 30.42 volts**	**Hour Meter Voltage**
Pin 9	**K4 Relay Contact 1**	**Starter Relay**
Pin 10	**K4 Relay Contact 2**	**Starter Relay**
Pin 11	**K3 Relay Contact 1**	**Glow Plug Relay**
Pin 12	**K3 Relay Contact 2**	**Glow Plug Relay**
Pin 13	**K2 Relay Contact 1**	**Activation Relay**
Pin 14	**K2 Relay Contact 2**	**Activation Relay**
Pin 15	**K1 Relay Contact 1**	**Cold Weather Kit**
Pin 16	**K1 Relay Contact 2**	**Cold Weather Kit**

To its right, there's an 8 position ***Ethernet*** style connector for running a patch cable to the inverters ***CanBus BMK*** connector. Each pin of this connector has the following functions:

Pin 1	**RS485-A**	**RFU**
Pin 2	**RS485-B**	**RFU**
Pin 3	**Ground**	**Ground**
Pin 4	**CAN-H**	**CanBus High**
Pin 5	**CAN-L**	**CanBus Low**
Pin 6		
Pin 7		
Pin 8		

The RS485 communications link is at this time ***Reserved For Future Use*** with the potential of communicating via **Modbus** to an inverter at a future date.

2.3 Right Panel

To the right side of the cabinet, a moulding protrudes in which their are two bolts and fasteners attached. These are the two points in which the cable from the inverters positive battery input, and the battery array's positive terminal must connect.

Two fasteners mounted vertically meant for fastening the 1/0 AWG (1 aught) cable from the battery (and it's disconnect switch), with the other fastener meant for fastening a short piece of cable between the inverter and the **AGS-S03**.

Note: The fastener mounted vertically closest to the display must be connected to the battery (through it's disconnect switch). While the other fastener connects a short piece of cable to the inverters positive battery input.

3 Installation

When a customer places an order for the **AGS-S03 Weile Enterprises** will complete the following tasks designed to make the installation as simple and straight forward as possible:

1. We provide a **template** to the customer to fill out in order for us to proceed with configuring and supplying the **AGS-S03**.
2. We will construct a **wiring diagram** for the installation.
3. We will supply a **Wiring Harness at no charge** to the customer provided that the cable lengths are limited to **under 20 feet** from the **AGS-S03** to the generator and that the temperature sensors cables are also limited to **under 20 feet**. We would have to charge extra for cabling as well as possibly needed items such as AC to DC modules etc. Additional costs will be brought to the customers attention prior to shipment.
4. We will open an account for the customer such that they can log into the **server** and set the **configuration settings** of the **AGS-S03** to acceptable parameters based on the input we had received from the customer.
5. We will provide expert **technical support** at the installation time at no charge provided we receive notification before hand as to the time and date the customer would be doing the installation.

Note: There are parameters that will have to be setup correctly on Hybrid inverters to match those of the **AGS-S03**. Parameters such as the **Start and Stop values** for the ***State Of Charge***, the **Maximum Charge Voltage**, **Maximum Charge and Discharge Currents**, etc. At **Weile Enterprises** we have experience in working with dozens of various makes and models of Hybrid inverters.

4 Device Operations

There are seven possible **States** that the **AGS-S03** operates in (**Note:** that the Warm Up State, the Generator Start Up State, and the Generator Cool Down State, are never entered into unless the **AGS-S03** is attached to a generator).

1. **System initialization State**
2. **Idle State**
3. **Warm Up State**
4. **Generator Start Up State**
5. **Charger Running State**
6. **Generator Cool Down State**
7. **Error State**

4.1 System initialization State

When the **AGS-S03** is turned on, it proceed through running an Inverter Communications check as well as diagnostics on various subsystems the system uses.

- The display will indicate **Weile Enterprises** on its top line with **AGS-S03** followed by its **Software Version number 3.00** being displayed on the bottom line.
- The **AGS-S03** will then test its **CanBus communication link** with the hybrid inverter. **System Restarting** will be displayed on the top line, and either **Inverter is Online** or **Inverter is Offline** will be displayed on the bottom line.
- The **AGS-S03** will run a memory test and display **Memory Tests Passed** on its bottom line.
- The **AGS-S03** will run flash memory test and display **Flash Memory Passed** on its bottom line.
- The **AGS-S03** will run flash memory test and display **Comm Link Is Active** on its bottom line.

- The **AGS-S03** will run flash memory test and display **Calibration Complete** on its bottom line.

After completing the steps itemized above, and if the **AGS-S03** is configured as being **Generator Attached** it will proceed with the following tests:

- If the generator is running it will go into the **Generator Cool Down State** and wait for the generator to stop.
- The **AGS-S03** will then measure the generators battery voltage in order to determine if the generator is connected. If the **12 volt battery** in the generator measures less than **1.0 volts**, the **AGS-S03** will go into the **Error State** as the generator is not physically connected.
- If **Temperature Sensor 0** is used to start and stop a generator ***(See Section on Temperature Sensors)***, and if **Temperature Sensor 0** is not connected. The **AGS-S03** will go into the **Error State**.

If the **AGS-S03** had been put into ***State Of Charge*** **Re-Calibration Mode** ***(See Section on State Of Charge Re-Calibration)*** and if attached to a generator the **AGS-S03** will go into the **Generator Start Up State** and attempt to start the generator.

If in the **Re-Calibration Mode** and the **AGS-S03** is not generator attached, the **AGS-S03** will go into the **Charger Running State**.

If none of the above conditions apply, the **AGS-S03** will go into the **Idle State**.

4.2 Idle State

While the **AGS-S03** is in the **Idle State**, it will be running tests at ten second intervals and displaying the battery voltage and generator voltage (if generator attached) on it's display. After a 2 second pause either ***EST SOC*** or ***SOC*** will be displayed on the **top line** of the display, the **bottom line** will display the current being supplied or drained from the inverters battery.

When ***EST (Estimated) SOC*** is displayed on the top line, the ***State Of Charge*** has not been **Established** and it will be necessary to do a ***(See Section on State Of Charge Re-Calibration)***.

If the **AGS-S03** is **generator attached**, tests will be made to determine whether or not the generator is still connected, if the generator had been **manually started**, and if **Temperature Sensor 0** is connected when **temperature sensor triggering** has been enabled ***(See Section on Temperature Sensors)*** on a one minute interval.

If the **AGS-S03** is **generator attached**, and the **Cold Weather Kit is attached and enabled**, the **AGS-S03** will activate the **Cold Weather Kit** for a **30 minute period** and go into the **Warm Up State** in the event that it measures the generators battery voltage to be **less than 9.5 volts**. This enables the battery charger of the generators **Cold Weather Kit** to charge the battery, with measurements being taken on a one minute interval.

When the **AGS-S03** is **generator attached**, and the ***State Of Charge*** is **Established** the **AGS-S03** will either go into the **Warm Up State** (if the **Cold Weather Kit is Enabled**), or go into the **Start Generator State** when the **Cold Weather Kit** is not installed or Disabled. Once the calculated ***State Of Charge*** drops below the configured **Start SOC** value from ***20 to 99 percent***.

When the ***State Of Charge*** is **Not Established** the **AGS-S03** will either go into the **Warm Up State** (if the **Cold Weather Kit** is Enabled), or go into the **Start Generator State** when the **Cold Weather Kit** is not installed or Disabled. Once the voltage measured on the inverters battery drops below a configured value from ***39.8 to 62.0 volts***.

When the **AGS-S03** is **Not generator attached**, and the ***State Of Charge*** is **Established** the **AGS-S03** will go into the **Charger Running State** once the calculated ***State Of Charge*** drops below the configured **Start SOC** value from ***20 to 99 percent***.

When the ***State Of Charge*** is **Not Established** the **AGS-S03** will go into the **Charger Running State** once the voltage measured on the inverters battery drops below a configured value from ***39.8 to 62.0 volts***.

4.3 Warm Up State

The **Warm Up State** is only entered into if the **AGS-S03** is **Generator Attached** and if the **Cold Weather Kit** has been enabled for use. The **Warm Up State** is never entered into if the **AGS-S03** is not **Generator Attached**.

Primarily used for activation of the **Cold Weather Kit** of Propane powered generators, the state will be entered into from the **Idle State** when either of the following events takes place:

1. The generators 12 volt battery's voltage level has dropped below **9.5 volts**, which will cause the **AGS-S03** to activate the generators **Cold Weather Kit** for **30 Minutes**.

2. An event occurred in the **Idle State** which would normally have caused the **AGS-S03** to go into the **Generator Start Up State** but the **Cold Weather Kit** run time value has been set to a time value of from **30 to 120 minutes** (programmable in 30 minute intervals) such that the **AGS-S03** will enter into the **Warm Up State** for the programmed amount of time prior to determining if there were still a need to start the generator.

As with the **Idle State**, every ten seconds the **AGS-S03** will be checking for potential error causing problems, such as the generator being disconnected, manually started, etc. Prior to updating it's display with the measured and calculated values (**Idle State**, the **AGS-S03** will display **Elapsed Warmup** on the top row of the display, followed by **Time: xxx Minutes** being displayed on the bottom row (where xxx represents the elapsed minutes).

Once the elapsed warm up time interval has reached the time limit it had been configured to (or 30 minutes if the state had been entered into by the generators battery having a low voltage) The **AGS-S03** will make a determination as to whether or not it should start the generator and proceed to enter into either the **Generator Start Up State**, or to go back into the **Idle State**.

Note: In most cases the **AGS-S03** will require the addition of a Solid State Relay to be used for switching AC to the generators AC input for its **Cold Weather Kit**. **Weile Enterprises** has an easy to install accessory available which contains a **CSA Approved Schneider Electric SSP1A125BDE (125 volt 25 Amp) SSR for Cold Weather Kit attachment**.

4.4 Generator Start Up State

The **Generator Start Up State** is only entered into if the **AGS-S03** is **Generator Attached**. When the **AGS-S03** is **Not Generator Attached**, the **Charger Running State** would be entered into.
The **AGS-S03** uses three relays to start a generator **contacts rated at 10 Amps**, each relays function is listed below:

1. **Relay K2** ***activation*** Used with all makes of generators.
2. **Relay K3** ***glow plug*** Used with Diesel generators.
3. **Relay K4** ***starter*** Used primarily with Diesel generators.

Relays **K3** *glow plug* and **K4** *starter* have configurable **Delay** and **Activation** times measured in seconds associated with them, which may be configurable from **1 to 200 seconds**.

After the **Relay Activation Cycle** has completed, the **hour meter voltage** from the generator is measured **10 seconds later** in order to determine whether or not the generator has started. If the generator had failed to start, all relays are deactivated for 5 seconds and the **AGS-S03** will re-attempt to start the generator based on it's configured **startup attempt** value ranging from **1 to 9 attempts**.

Once the generator starts up the **AGS-S03** will go into the **Charger Running State**, in the event that the generator fails to start after all attempts are used up, the **AGS-S03** will go into the **Error State** and display a **Generator Failed to Start** message on its display.

Note: For further information, please refer to the **Configuration Setup** section of this document regarding the settings of the timing parameters for the **Relay K3** ***glow plug*** and **Relay K4** ***starter*** relays.

Note: In some cases depending on the peak currents being drawn from either the glow plug or starter solenoids, it may be necessary to install external chassis mount relays at the generator.

4.5 Charger Running State

When the **AGS-S03** enters the **Charger Running State**, it will be monitoring events which would trigger an error condition such as whether or not the generator is still running, disconnected, temperature sensor 2 measures an engine compartment temperature that is higher than 85 degrees Celsius, etc. With each measurement being taken on a **10 second interval**, before the **AGS-S03** makes a decision whether or not to go into the **Error State**.

Similar to the **Warm Up State**, the **AGS-S03** will display **Elapsed Charging** on the top row of the display, followed by **Time: xxx Minutes** being displayed on the bottom row (where xxx represents the elapsed minutes).

Every minute the **AGS-S03** will make a decision as to whether or not it should go back into the **Idle State** when **Not Generator Attached**, or stop the generator and go into the **Generator Cool Down State** when **Generator Attached**. The decision will be made based on the following criteria:

1. If the ***State Of Charge*** is **Established** and the calculated value is at or greater than the configured **Stop SOC Value**, the **AGS-S03** would ***Potentially*** go into the **Idle State** or **Generator Cool Down State** if **Generator Attached**.

2. If the ***State Of Charge*** is **Not Established** and the voltage measured on the inverters battery is at or greater than the configured **Inverter Battery High Cut Off Value**, the **AGS-S03** would ***Potentially*** go into the **Idle State** or **Generator Cool Down State** if **Generator Attached**.

3. If the **AGS-S03** is **Generator Attached** and had been set up to use **Temperature Sensor 0** as a method to start and stop the generator, and if the measured temperature qualifies a valid stop condition, the **AGS-S03** will proceed to the **Generator Cool Down State**, provided that either of the above two criteria for stopping the generator has been met.

Note: If the **AGS-S03** remains in the **Charger Running State** longer than its configured **Maximum Run Time** value **30 to 600 minutes**, the **AGS-S03** will go into the **Error State** and display a message that the Charging System had failed to charge the battery within the **Time** setting.

Note: For further information please review the **Configuration Setup** section of this document regarding the settings of the **Stop SOC**, **Inverter Battery High Cut Off Value**, as well as the information contained in the **Temperature Sensors section**.

4.6 Generator Cool Down State

The **Generator Cool Down State** will never be entered into unless the **AGS-S03** is **Generator Attached**.

While in the **Generator Cool Down State** the **AGS-S03** will be monitoring events which would trigger an error condition such as whether or not the generator has been disconnected, temperature sensor 2 measures an engine compartment temperature that is higher than **85 degrees** Celsius, etc. With each measurement being taken on a **10 second interval**, before the **AGS-S03** makes a decision whether or not to go into the **Error State**.

If the **AGS-S03** detects that the generator has stopped running it will go back into the **Idle State**, otherwise it will display **Elapsed Cooldown** on the top row of the display, followed by **Time: xxx Minutes** being displayed on the bottom row (where xxx represents the elapsed minutes). The **AGS-S03** will then display its measured and calculated values.

Every minute the **AGS-S03** will make a determination as to whether or not the system has remained in the **Generator Cool Down State** beyond its configured **Maximum Cool Down Time Limit** and if so will go into the **Error State** displaying a message that the generator had failed to stop.

Note: For further information please review the **Configuration Setup** section of this document regarding the settings of the **Maximum Cool Down Time Limit**, a value configurable from **1 to 60 minutes**.

4.7 Error State

There are several reasons why the **AGS-S03** may have gone into the **Error State**, most of the conditions which caused the system to go into the **Error State** can be solved without operator intervention being required. For example; a generator failing to start may just need its relay timing parameters modified.

Once the **AGS-S03** goes into the **Error State** it will (if in communications with a router) send a message to the **Weile Enterprises** server which in turn will send an email message to the customer detailing the cause of the error.

There are several possible reasons as to why the **AGS-S03** had gone into the **Error State**, with each reason being displayed on its display and with the **Fault Indicator** flashing at two second intervals. Below is a listing of the possible error's the **AGS-S03** which had caused the system to go into the **Error State**:

1. Generator failed to start issue
   - Error requires operator intervention.
2. Generator failed to stop issue
   - Error cleared once generator stops.
3. Charging system failed to charge the battery
   - System clears error after 5 minutes and restarts.
4. Generator stopped unexpectedly
   - System clears error after 5 minutes and restarts.
5. Generator has been disconnected fault
   - Error cleared once generator is connected.
6. Generator was manually started
   - Error cleared once generator stops.
7. Temperature sensor 0 fault condition
   - Error cleared once the sensor is re-connected.
8. Over temperature measured on sensor 2
   - Error cleared once the temperature measured by the sensor is lower than 60 degrees Celsius
9. Charger or info switch is stuck
   - Error cleared once switches are released.
10. Inverter battery is lower than the UVLO
    - Error cleared once the battery voltage is greater than the under voltage lockout value.

Most of the causes of the error condition can be resolved by modification of the parameters in the systems configuration. Even hard error conditions such as a broken temperature sensor 0 can be disabled and the system restarted at the site or by the customer going into the **Control Panel** on the server.

Some errors indicate a miss-match of the configuration settings between the inverter and the **AGS-S03** - for example if the system is **Not Generator Attached** and the **Generator failed to charge battery** message comes up, there is a strong likelihood that the **Start Charging SOC** or the **Stop Charging SOC** values between the two systems are not set identically.

In the event that communication is lost between the inverter and the **AGS-S03**. The system will make re-attempts every minute to determine if the communications link has been re-established.

5 Temperature Sensors

The **AGS-S03** connects to four temperature sensors used for the following purposes:

1. **Temperature Sensor 0** may be used to start and stop a generator if the **AGS-S03** is **Generator Attached** and ***if* Temperature Sensor Triggering is enabled**. Temperature Sensor 0 in effect can be used to pre-start and stop a generator based on the temperature. This feature is quite useful in installations where space heaters and air conditioning systems are used. If not Generator Attached and Temperature Triggering is not enabled. **Temperature Sensor 0**, only reports it's temperature measurements from the area its located to the Server.

2. **Temperature Sensor 1** is strictly used to measure the temperature on one of the inverters batteries for temperature compensation purposes.

3. **Temperature Sensor 2** may be used to measure the temperature of an attached generators engine compartment. In the event that the temperature read by this sensor exceeds 85 degrees Celsius when the **AGS-S03** is **Generator Attached** the system will go into the **Error State** until the temperature drops below 60 degrees Celsius. When not **Generator Attached** the sensor only reports it's temperature measurements from the area its located to the Server.

4. **Temperature Sensor 3** is used solely to report the ambient temperature measurements from the area its in to the server.

5.1 Temperature Sensor 0 Setup

There are two values associated with **Temperature Sensor 0**, a **Start value** and a **Stop value**.

- When the **Start value is lower than the Stop value**, the **AGS-S03** considers that the sensor is being used with **space heaters**. It will start the generator when the temperature falls below the **Start value**, and stop the generator when the temperature goes above the **Stop value**.

- When the **Start value is higher than the Stop value**, the **AGS-S03** considers that the sensor is being used with **air conditioning systems**. It will Start the generator when the temperature is above the **Start value**, and Stop the generator when the temperature goes under the **Stop value**.

5.2 Grid Monitoring Feature

In certain localities a power utility may forbid the grid to be fed into the grid input port of the inverter, the utility requires that the grid be fed into the generator input port on the inverter. In certain installations both the grid as well as a back up generator are used. In order to get around this requirement, it will be necessary that an **Auto Transfer Switch** be used with the grid and generator power fed into the ATS and the output of the ATS feeding the generator input on the inverter.

The **AGS-S03** is able to support installations where both the grid and generator are fed in through an **Auto Transfer Switch** to the generator input port on the inverter. Provided that it has knowledge of whether or not the grid is active or not. We recommend that an external 120 VAC to 12 VDC converter be used such as the **IRM-30-12ST model from Mean Well Corporation** to feed the 12 volts into pin 1 of the 16 pin connector on the **AGS-S03**.

6 State Of Charge Re-Calibration

When batteries are added, removed, replaced, or when the **AGS-S03** is first installed. A **State of Charge Re-Calibration will have to be completed in order for the State Of Charge to become Established**. This is accomplished either by going into the System Configuration at the **AGS-S03** or by logging into the ***Control Panel*** on the server.

Before starting the **State of Charge Re-Calibration** process, the following steps should be taken:

1. For Grid Tie systems, ensure that the grid voltage is present.
2. For Off Grid tie systems, ensure that the generator is in good working order and has enough fuel.
3. Switch the **PV voltage switch to the OFF position** while doing the Re-Calibration.

When the **State of Charge Re-Calibration** process is started. The **AGS-S03** will tell a hybrid inverter that it's **State Of Charge is only at a 25 % level**. The system will then attempt to start the generator if **Generator Attached** or it will go straight into the **Charger Running State**

Most of the tests that are normally done while the system is in the **Charger Running State** are not carried while the **State Of Charge is being Re-Calibrated**. Instead the **AGS-S03** monitors the current being supplied from the inverter to its battery array.

When the current being supplied to the battery array drops below **1 percent** of the battery arrays capacity (typically **400 Amp Hours**) and **remains under 1 percent throughout a period of two minutes**. The **AGS-S03** will begin increasing the State Of Charge value it is sending to the inverter by **0.75 percent every 2 seconds**.

Once **99 %** has been sent to the inverter. The **State Of Charge Re-Calibration** process is stopped, and the system will go into either the **Idle State - when Not Generator attached** or it will go into the **Generator Cool Down State when Generator Attached**.

7 System Configuration

With the exception of the **Initialization State** and the **Generator Start Up State**, a number of functions may be undertaken by the **AGS-S03**, as well as allowing the operator to modify any configuration relevant parameter.

The System Configuration is entered into when the operator presses the rotary switch. These functions and configuration relevant processes are enumerated below.

Note: Characters displayed on the top row of the display are separated by a / symbol from those characters displayed on the bottom row of the display.

1. **Restart System / Press Select** will be displayed and the system will restart if the switch is pressed. If the switch is rotated clockwise and the system is either in the **Idle State** or the **Warm Up State** item **2** will be displayed, otherwise the system will display item **3**.

2. **SOC Re-Calibration / Press Select** will be displayed. If the operator rotates the switch either item **1** or item **3** will be displayed. If the operator presses the switch a message displaying **SOC Re-Calibration / Starting** will be displayed and the system will go into the **Generator Start Up State (if Generator Attached)** or it will go into the **Charger Running State (When Not Generator Attached). (Note: for further information please refer to the State Of Charge Re-Calibration section of this document)**.

3. **Update Firmware / Press Select** will be displayed and the **AGS-S03** will see if the server has a update available when the switch is pressed. **Note: That the inverter should be placed into bypass mode, as the AGS-S03 will stop communicating with the inverter while it is being updated**.

   In the event that an update is not available the **Firmware Update Is Not Available** will be displayed. If the switch is rotated counter clockwise and if the system is in the **Idle State** or the **Warm Up State** item **2** will be displayed otherwise item **1** will be displayed.

   When an update is available, it will automatically be downloaded with **Firmware Update / Now In Process** being displayed. On completion the **AGS-S03** will restart using the new firmware.

4. **Generator Attached / Press Select** will be displayed.
   When the **AGS-S03** is **Generator Attached** several additional parameters are needed to properly configure the system. When **Not Generator Attached** all generator related parameters are **bypassed** while the operator is configuring the system.
   Pressing the switch down will display the existing setting **either Attached or Not Attached** on the bottom line of the display rotating the switch toggles the selection, while pressing the switch will either cause the **AGS-S03** to display item **5** when **Generator Attached** or to display item **13** when **Not Generator Attached**.

5. **Grid Monitoring / Press Select**. If the operator rotates the switch either item **4** or item **6** will be displayed.
   When the operator presses the switch, the display will indicate either **enabled** or **disabled**, rotating the switch will cause the display to be toggled. Pressing the switch will cause the **AGS-S03** to display item **6**.

6. **Set Generator Type / Press Select**. If the operator rotates the switch either item **5** or item **7** will be displayed.
   When the operator presses the switch the current generator type setting will be displayed as either:

   - **Set Generator Type: 0 / Sequence: K2 K3 K4**
   - **Set Generator Type: 1 / Sequence: K3 K4 K2**

   Note: Please review the section detailing the Generator Start Up State in this document for further information. Rotating the switch causes the display to toggle between the two selections, pressing the switch will cause the generator type to be updated and the system will display item **7**.

7. **Hour Meter Polarity / Press Select**. If the operator rotates the switch either item **6** or item 8 will be displayed.
   If the operator presses the switch the current either **Active High OR Active Low** setting will be displayed so that the operator can **toggle** between the two selections by rotating the switch.
   Pressing the switch will cause the setting to be updated and the system will display item **8**.

8. **Startup Attempts / Press Select**. If the operator rotates the switch either item **7** or item **9** will be displayed. When the operator presses the switch the current setting will be displayed in the format of **Generator Startup / Atempts: X** where **X** can be set from either **1 to 9 attempts** by the operator simply rotating the switch. When the operator presses the switch the new setting will be updated and the system will display item **9**.

9. **Set Relay K3 / Time Delay Value**.
   Note: Relay K3 *The Glow Plug Relay* is used primarily for diesel generators.
   If the operator rotates the switch either item **8** or item **10** will be displayed. When the operator presses the switch the current setting will be displayed in the format of **Relay K3 Delay / Seconds: XXX** where **XXX** can be set from **1 to 200 seconds** by the operator simply rotating the switch. When the operator presses the switch, the setting will be updated and the system will display line **10**.

10. **Set Relay K3 / Activation Time**. If the operator rotates the switch either item **9** or item **11** will be displayed. When the operator presses the switch the current setting will be displayed in the format of **Relay K3 Active Time / Seconds: XXX** where **XXX** can be set from **1 to 200 seconds** by the operator simply rotating the switch. When the operator presses the switch the setting will be updated and the system will display item **11**.

11. **Set Relay K4 / Time Delay Value**.
    Relay K4 *The Starter Solenoid Relay* is used primarily for diesel generators.
    If the operator rotates the switch either item **10** or item **12** will be displayed. When the operator presses the switch the current setting will be displayed in the format of **Relay K4 Delay / Seconds: XXX** where **XXX** can be set from **1 to 200 seconds** by the operator simply rotating the switch. When the operator presses the switch, the setting will be updated and the system will display item **12**.

12. **Set Relay K4 / Activation Time**. If the operator rotates the switch either item **11** or item **13** will be displayed.
    When the operator presses the switch the current setting will be displayed in the format of **Relay K4 Active Time / Seconds: XXX** where **XXX** can be set from **1 to 200 seconds** by the operator simply rotating the switch.
    When the operator presses the switch the setting will be updated and the system will display item **13**.

13. **Inverter Battery / Set: Low Trigger**.
    Note: Until the *State Of Charge* has been Established, the system will use the voltage measured on the inverters battery in determining whether or not to start the generator. If the voltage measured was lower than the Low Trigger value the system would either try to start the generator if Generator Attached OR go directly into the Charger Running State.
    If the operator rotates the switch counter clockwise, either item **4 - (When Generator Not Attached)** or item **12 - (When Generator Attached)** will be displayed. If the operator rotates the switch clockwise item **14** will be displayed.
    If the operator presses the switch **Start Charging / At: XX.X Volts** will be displayed. The operator can then rotate the switch to change the **XX.X** value from **39.8 to 62.0 volts**. Once the operator presses the switch the setting will be updated and the system will display item **14**.

14. **Inverter Battery / Set: High Cutoff**.
    Note: Until the *State Of Charge* has been Established, the system will use the voltage measured on the inverters battery in determining whether or not to stop the generator if Generator Attached or go into the Idle State when Not Generator Attached.
    If the operator rotates the switch counter clockwise item **13** will be displayed. If the operator rotates the switch clockwise the system will display item **15** if **Generator Attached**, or display item **18** when **Not Generator Attached**.
    If the operator presses the switch **Stop Charging / At: XX.X Volts** will be displayed. The operator can then rotate the switch to change the **XX.X** value from **39.8 to 62.0 volts**. Once the operator presses the switch the setting will be updated and the system will display item **15** if **When Generator Attached**, or display item **18** when **When Not Generator Attached**.

15. **Temperature Trigger / Press Select**.
    Note: The system must be Generator attached before Temperature Sensor 0 can be used as a start stop trigger mechanism (see the section on Temperature Sensors for more information).
    If the operator rotates the switch either items **14** or **18** will be displayed, if the operator presses the switch **Temperature Trigger / Sensor Enabled** or **Temperature Trigger / Sensor Disabled** will be displayed. The operator can then ***toggle*** the selection by rotating the switch. When the operator presses the switch with the sensor being disabled the system will display item **18**. Otherwise it will display item **16** when the sensor is enabled.

16. **Set Start Value / Press Select**. If the operator rotates the switch the system will display either items **15** or **17**. If the operator presses the switch **Temperature Sensor / Start Value: XX.X C** will be displayed at which point the operator can rotate the switch to set the **XX.X** value from **-50.0 to +50.0** degrees with a **0.5** degree resolution. Pressing the switch will cause the system to update the new value and display item **17**.

17. **Set Stop Value / Press Select**. If the operator rotates the switch the system will display either items **16** or **18**. If the operator presses the switch **Temperature Sensor / Stop Value: XX.X C** will be displayed at which point the operator can rotate the switch to set the **XX.X** value from **-50.0 to +50.0** degrees with a **0.5** degree resolution. Pressing the switch will cause the system to update the new value and display item **18**.

18. **Set Battery Capacity / Press Select**. If the operator rotates the switch counter clockwise the system will either display item **15** if **When Generator is Attached** or item **13** when **When Generator is Not Attached**, rotating the switch clockwise will display item **19**.
    If the operator presses the switch, **Battery Capacity / XXXX Amp Hours** will be displayed where **XXXX** represents the current Amp Hour setting. The operator can then rotate the switch to adjust the battery capacity from **100 to 2000 Amp Hours** with a **10** Amp resolution. Pressing the switch will cause the system to update the new value and display item **19**.

19. **Set Charge Current / Press Select**. If the operator rotates the switch, the system will either display item **18** or **20**. If the operator presses the switch **Max Charge Current / XXX Amps** will be displayed where **XXX** represents the maximum charge current. The operator can then rotate the switch to adjust the charge current from **20 to 200 Amps** with a resolution of **10** Amps. Pressing the switch will cause the system to update the new value and display item **20**.

20. **Set Max Discharge / Current Press Select**. If the operator rotates the switch, the system will either display item **19** or **21**. If the operator presses the switch **Discharge Current / XXX Amps** will be displayed, where the **XXX** represents the maximum discharge current. The operator can then rotate the switch to adjust the charge current from **20 to 200 Amps** with a resolution of **10** Amps. Pressing the switch will cause the system to update the new value and display item **21**.

21. **Set Charge Voltage / Current Press Select**. If the operator rotates the switch, the system will either display item **20** or **22**. If the operator presses the switch **Charge Voltage / XX.X DC Volts** will be displayed, where the **XX.X** represents the maximum charge voltage. The operator can then rotate the switch to adjust the charge voltage from **48.0 to 62.0 Volts** with a resolution of **0.1** Volts. Pressing the switch will cause the system to update the new value and display line **22**.

22. **Undervoltage Lockout / Press Select**. If the operator rotates the switch, the system will either display item **21** or **23**. If the operator presses the switch **Undervoltage Lockout / XX.X DC Volts** will be displayed, where the **XX.X** represents the Under Voltage Lockout value. The operator can then rotate the switch to adjust the under voltage lockout value from **39.0 to 52.0 Volts** with a resolution of **0.1** Volts. Pressing the switch will cause the system to update the new value and display item **23**.

23. **Set SOC Start / Press Select**. If the operator rotates the switch, the system will either display items **22** or **24**. If the operator presses the switch **Start Charging At / XX % SOC** will be displayed, where the **XX** represents the ***Start State Of Charge*** value. The operator can then rotate the switch to adjust the ***State Of Charge*** **Start** value from **20 to 99 percent** with a **1** percent resolution. Pressing the switch will cause the system to update the new value and display item **24**.

24. **Set SOC Stop / Press Select**. If the operator rotates the switch counter clockwise the system will display item **23**. If the switch is rotated clockwise either item **25** if **Generator Attached**, or item **26** when **Not Generator Attached** will be displayed.
    If the operator presses the switch **Stop Charging At / XX % SOC** will be displayed, where **XX** represents the ***Stop State Of Charge*** value. The operator can then rotate the switch to adjust the ***State Of Charge*** **Stop** value from **20 to 99 percent** with a **1** percent resolution. Pressing the switch will cause the system to update the new value and display item **25** when **Generator Attached**, or item **26** when **Not Generator Attached**.

25. **CWK System Attached / Press Select**.
Note: The *Cold Weather Kit* usage may require an external *Solid State Relay* to be attached at the generator.
If the operator rotates the switch the system will display item **24** or **26**.
If the operator presses the switch one of five messages will be displayed:

    - **Cold Weather Kit / Is Disabled**
    - **CWK Activation Time / 30 Minutes**
    - **CWK Activation Time / 1 Hour**
    - **CWK Activation Time / 1.5 Hours**
    - **CWK Activation Time / 2 Hours**

    The operator can then rotate the switch to select the selection they want to use. Once the switch is pressed the system to update the new value and display item **26**.

26. **Charging System Time / Press Select**. If the operator rotates the switch counter clockwise the system will either display item **25** if **Generator Attached** or item **24** if **Not Generator Attached**. If the operator rotates the switch clockwise the system will either display item **27 Generator Attached** or item **28** when **Not Generator Attached**. Pressing the switch will cause **Max Charging System / Run Time: XX.X Hours** to be displayed, where **XX.X** represents the hours with a range of from **0.5 to 10.0 hours** (default setting is 6.0 hours). Pressing the switch will cause the updated value to be used and display item **27** if **Generator Attached** or item **28** when **Not Generator Attached**.

27. **Generator Cooldown / Press Select**. If the operator rotates the switch either item **26** or item **28** will be displayed. If the operator presses the switch - **Cooldown Time / Minutes: XX** will be displayed, where **XX** represents the generator cool down time in minutes. The operator can then adjust the maximum cool down time allowed for the generator to stop running with values of **1 minute, 5 to 30 minutes (in 5 minute increments / decrements), and 30, and 60 minutes**. Once the operator presses the switch the system will update the value and display item **28**.

28. **Setup Wifi Radio / Press Select**. If the operator rotates the switch counter clockwise either the system will display item **27** when **Generator Attached** or item **26** when **Not Generator Attached**. Rotating the switch clockwise will cause the system to display item **31**. If the operator presses the switch the system will display item **29**.

29. **Set Router Name / Press Select**. If the operator rotates the switch either item **28** or item **30** will be displayed.

    If the operator presses the switch the existing routers name will be displayed followed by a **T/M** symbol which acts as a termination character and **must** be the last character displayed in the routers name.

    An underline cursor will be displayed that can be moved via rotating the configuration switch to any character in the name as well as the **T/M** symbol. In order for the operator to select and modify that specific character, they simply press down on the switch which will cause the entire character to blink between a solid white block so that the operator can then rotate the switch to display a new character. Pressing the switch will cause the system to re-display the routers name with the cursor under the character that had just been potentially modified.

    Once the operator selects the **T/M** character and presses the switch, the system will display item **30**

30. **Set Router Password / Press Select**. If the operator rotates the switch either item **29** or item **31** will be displayed.

    If the operator presses the switch the existing routers password will be displayed followed by a **T/M** symbol which acts as a termination character and **must** be the last character displayed in the routers password.

    An underline cursor will be displayed that can be moved via rotating the configuration switch to any character in the name as well as the **T/M** symbol. In order for the operator to select and modify that specific character, they simply press down on the switch which will cause the entire character to blink between a solid white block so that the operator can then rotate the switch to display a new character. Pressing the switch will cause the system to re-display the routers password with the cursor under the character that had just been potentially modified.

    Once the operator selects the **T/M** character and presses the switch, the system will display item **31**

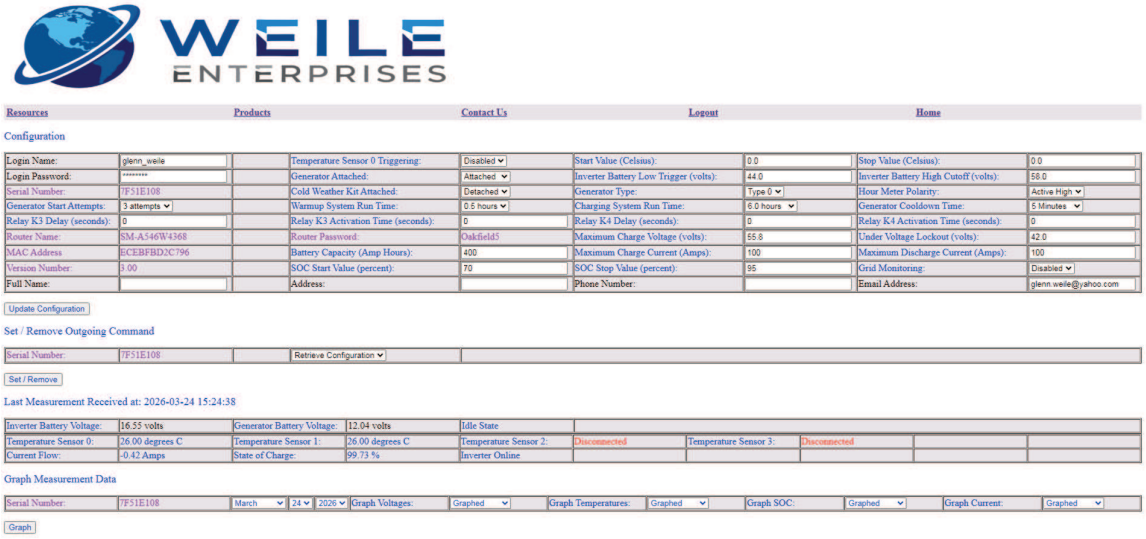
31. **Update Configuration / Press Select**. If the operator rotates the switch counter clockwise the system will display item **28**. If the operator presses the switch the system will verify if any changes were made to its existing configuration. If no configuration changes had been made, the system will go back into the **same state that it was in when the configuration switch had first been pressed**.
    When configuration changes have been made, the system will display either of the following:

    - **Router Not Attached / System Restarting**.
      The new Router Name was blank.
    - **Server Updated / System Restarting**.
      The server has been updated with the new configuration.
    - **Server Offline / System Restarting**.
      The server could not be updated. Probable cause being an invalid Router Name or Password.

    The system will then begin using the new parameters and go into the **System Initialization State**.

8 Server Operations

When a customer logs into the **Control Panel** on the **Weile Enterprises** server. A web page will be displayed as illustrated below.



There are five different sections of the page, with each section being described in the various subsections.

1. The **Configuration** section contains all data and parameters specific to the installation site and to the **AGS-S03**.

2. The **Set / Remove Outgoing Command** section contains selections for retrieving the configuration from the **AGS-S03**, sending an updated configuration to the **AGS-S03**, etc.

3. The **Last Measurement Received** section contains the pertinent measurement data of the last frame that the server had received from the **AGS-S03**.

4. The **Graph Measurements** section contains a selection for the date, as well as what measurements to graph. Pressing the **Graph Button** will display a web page of the graphed data.

5. The **Last Error Frames Received** section contains a listing of the **last 10 error frames** that the server had received.

8.1 AGS-S03 Configuration

There are three groups of settings in this group.
Note: Items marked in black refer to static values that the MPS-S03 does not share. Items marked in blue are shared between the server and the MPS-S03. Items marked in purple are only sent to the server by the MPS-S03, the server cannot modify those items. Items marked in red indicate errors.

- Settings which reside on the server only.
- Settings that are shared between the server and the **AGS-S03**.
- Settings which are sent to the server by the **AGS-S03** that are not directly able to be modified on the server.

The first group of settings include the following:

1. The **Login Name** has a maximum of 16 characters, must have a minimum of 8 characters and include at least one special character, and at least one uppercase character.
2. The **Login Password** has a maximum of 16 characters, must have a minimum of 8 characters and include at least one special character, and at least one uppercase character.
3. The **Full Name** field can contain a maximum of 40 characters, it can be left blank and can contain any character.
4. The **Address** field can contain a maximum of 40 characters, it can be left blank and can contain any character.
5. The **Phone Number** field can contain a maximum of 20 characters, it can be left blank and can contain only numerical characters as well as the + symbol.
6. The **Email Address** field can contain a maximum of 40 characters, it can be left blank and can contain only the **@** and **.** symbols. No other special characters are allowed.

The second group of settings shared between the server and the **AGS-S03**, include the following:

1. The **Temperature Sensor 0 Triggering** selection can be selected to being **Enabled** or **Disabled**.

2. The **Start Value** value can be set from **-50.0 to +50.0 degrees** Celsius
   Note: The Start and Stop values will not be accepted if they are equal.

3. The **Stop Value** value can be set from **-50.0 to +50.0 degrees** Celsius
   Note: The Start and Stop values will not be accepted if they are equal.

4. The **Generator Attached** selection can be selected to being **Attached** or **Detached**.

5. The **Inverter Battery Low Trigger** value can be set from **39.8 to 62.0 volts**
   Note: The Low Trigger value cannot be equal to or greater than the High Cutoff value.

6. The **Inverter Battery High Cutoff** value can be set from **39.8 to 62.0 volts**
   Note: The Low Trigger value cannot be equal to or greater than the High Cutoff value.

7. The **Cold Weather Kit Attached** selection can be selected to being **Attached** or **Detached**.

8. The **Generator Type** selection can be selected to either **Type 0** or **Type 1**.

9. The **Hour Meter Polarity** selection can be selected to either **Active High** or **Active Low**.

10. The **Generator Start Attempts** value can be selected from a value of **1** to **9**.

11. The **Warm Up System Run Time** value can be selected from **0.5 to 2 Hours** in half an hour intervals.

12. The **Charging System Run Time** value can be selected from **0.5 to 10 Hours** in half an hour intervals.

13. The **Generator Cool Down Time** value can be selected from **1**, **5**, **10**, **15**, **20**, **25**, **30**, and **60** minutes.

14. The **Relay K3 Delay** value can be set from **0 to 200 seconds** Note: The Relay K3 Delay value plus the Relay K3 Activation Time value cannot exceed 200 seconds.

15. The **Relay K3 Activation Time** value can be set from **0 to 200 seconds** Note: The Relay K3 Delay value plus the Relay K3 Activation Time value cannot exceed 200 seconds.

16. The **Relay K4 Delay** value can be set from **0 to 200 seconds** Note: The Relay K4 Delay value plus the Relay K4 Activation Time value cannot exceed 200 seconds.

17. The **Relay K4 Activation Time** value can be set from **0 to 200 seconds** Note: The Relay K4 Delay value plus the Relay K4 Activation Time value cannot exceed 200 seconds.

18. The **Maximum Charge Voltage** value can be set from **48.0 to 62.0 Volts**.

19. The **Under Voltage Lockout** value can be set from **39.0 to 52.0 Volts**.

20. The **Battery Capacity** value can be set from **100 to 2000 Amp Hours** in **10** Amp Hour intervals.

21. The **Maximum Charge Current** can be set from **20 to 200 Amps** in **10** Amp intervals.

22. The **Maximum Discharge Current** can be set from **20 to 200 Amps** in **10** Amp intervals.

23. The **SOC Start Value** can be set from **20 to 99 %** Note: The SOC Start Value cannot be greater or equal to the SOC Stop Value.

24. The **SOC Stop Value** can be set from **20 to 99 %** Note: The SOC Start Value cannot be greater or equal to the SOC Stop Value.

25. The **Grid Monitoring** can be set to either **Enabled or Disabled %** Note: The value set will not be used by the **AGS-S03** unless the system is generator attached.

The third group of settings sent by the **AGS-S03** to the server strictly for informational purposes, are as follows:

1. The **Serial Number** field contains exactly 8 characters. It is used to uniquely identify the **AGS-S03** it's value cannot be changed.

2. The **MAC Address** contains the internal WiFi radios MAC address. It is exactly 12 characters long and can only be changed by replacing the internal WiFi radio.

3. The **Router Name** can contain up to 40 Characters. It can only be setup at the **AGS-S03** and is displayed only for technical support purposes on the server.

4. The **Router Password** can contain up to 40 Characters. It can only be setup at the **AGS-S03** and is displayed only for technical support purposes on the server.

5. The **Version Number** field indicates the software revision level of the **AGS-S03**. It can only be changed when a firmware update is downloaded from the server, and is displayed only for technical support purposes.

8.2 Set / Remove Outgoing Command

The operator is able to select various commands from a drop down selection box, that will be sent to the **AGS-S03** when the server receives data from the **AGS-S03**.

1. The **Retrieve Configuration** command will cause the **AGS-S03** to send its configuration settings to the server.

2. The **Update Configuration** command will cause the server to send out the updated configuration to the **AGS-S03**.

3. The **Restart** command will cause the **AGS-S03** to simply restart.

4. The **Re-Calibrate** command will cause the **AGS-S03** to start the **State Of Charge Re-Calibration** process.

5. The **Clear Alerts** command will cause the server to clear some of it's settings such that future **Email Alerts** will be sent out by the server in the event of a fault condition.

8.3 Last Measurement Received

The last measurement frame provides a quick indication of the status off the **AGS-S03** and the last time when the measurement had been received by the server.

1. The **Top Row** contains the following fields:
    - The **Inverter Battery Voltage** value will be displayed with a 2 decimal point accuracy.
    - The **Generator Battery Voltage** field will only be displayed if the **AGS-S03** is **Generator Attached**. The value will be displayed with a 2 decimal point accuracy.
    - The **State** field indicates the **State** the **AGS-S03** is in. The field is usually highlighted in **Blue**, except in the event that the system is in the **Error State**, in which case the cause of the error will also be displayed to the right of the state indicator field with both fields being highlighted in **red**.

2. The **Middle Row** contains measurements from the Temperature Sensors

   - The **Temperature Sensor 0** field will normally be highlighted in blue with the sensors temperature measurement displayed with 2 decimal place accuracy immediately to the right. If the sensor had been disconnected its measurement will be replaced by **Disconnected**
     If the system is **Generator Attached** and if Sensor 0 had been set up for use as a Temperature Trigger, and the measurement indicates the Sensor has been disconnected, the field will be highlighted in red. **Temperature Sensor 0**.
   - The **Temperature Sensor 1** (used to measure the inverter battery arrays temperature) field will normally be highlighted in blue with the sensors temperature measurement displayed with 2 decimal place accuracy immediately to the right. If the sensor had been disconnected its measurement will be replaced by **Disconnected**.
   - The **Temperature Sensor 2** (used to measure the engine compartment temperature of an attached generator) field will normally be highlighted in blue with the sensors temperature measurement displayed with 2 decimal place accuracy immediately to the right. If the sensor had been disconnected its measurement will be replaced by **Disconnected**.
     If the system is **Generator Attached** and if Sensor 2 measures a temperature reading greater than 85 degrees Celsius. The field will be highlighted in red **Temperature Sensor 2**, along with the temperature sensors measurement displayed to the right.
   - The **Temperature Sensor 3** field will normally be highlighted in blue with the sensors temperature measurement displayed with 2 decimal place accuracy immediately to the right. If the sensor had been disconnected its measurement will be replaced by **Disconnected**

3. The **Middle Row** contains miscellaneous measurements, as indicated below:

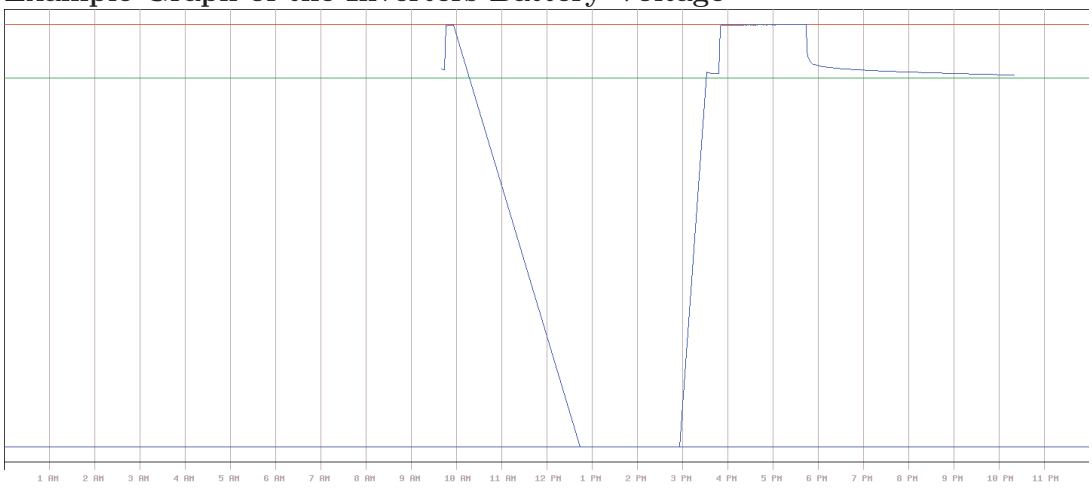
    - The **Current Flow** field displays the current (with a 2 decimal place accuracy) being drawn or supplied to the inverters battery at the time the server had received the data.
    - The **State Of Charge** field indicates the calculated State Of Charge with a 2 decimal point accuracy. When the **AGS-S03** has Established the State Of Charge (ie. State Of Charge Re-Calibration had been completed). The field as well as it's calculated value will be displayed in **blue**. When the State Of Charge is not Established both the field as well as its calculated value will be displayed in **red**.
    - The **Inverter Online** or **Inverter Offline** message will be displayed to the right hand side of the State Of Charge value.

8.4 Graph Measurements

The **Weile Enterprises** retains its measurement data on a yearly basis. This enables the operator to graph and **download** for a specific days measurements that will display the:

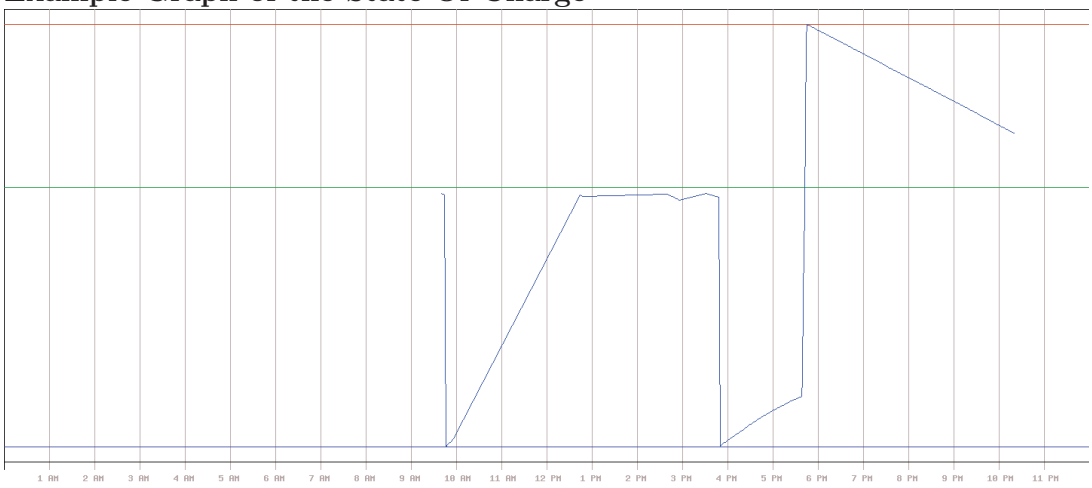
- The **Voltages Measured**. Both the inverters battery voltage as well as the generators battery voltage will be displayed (provided the system is **Generator Attached**).
- The **Temperatures Measured**. All four temperature sensor measurements will be graphed (unless disconnected) if the selection is made to graph the temperatures.
- The **Graph SOC**. The State Of Charge will be graphed if the selection is made to graph the measurement.
- The **Graph Current**. The Current flow between the inverter and its battery array will be graphed if the selection is made to graph the measurement.

Example Graph of the Inverters Battery Voltage



Inverter Battery Voltage Level
2025-07-02
Highest Voltage Measured was 55.8 Vdc at: 05:43 PM
Lowest Voltage Measured was 11.1 Vdc at: 02:40 PM
Average Voltage Measured was 50.1 Vdc

Example Graph of the State Of Charge



State of Charge Level
2025-07-02
Highest State of Charge Level was 99.8 % at: 05:45 PM
Lowest State of Charge Level was 25.2 % at: 09:46 AM
Average State of Charge Level was 71.1 %

Example Graph of the Current Flow

8.5 Last Error Frames Received

The last ten error conditions that had occurred are displayed in a descending order with the time and date, along with the cause of the error being displayed to its right. Refer to the section describing the **Error State** in this document.