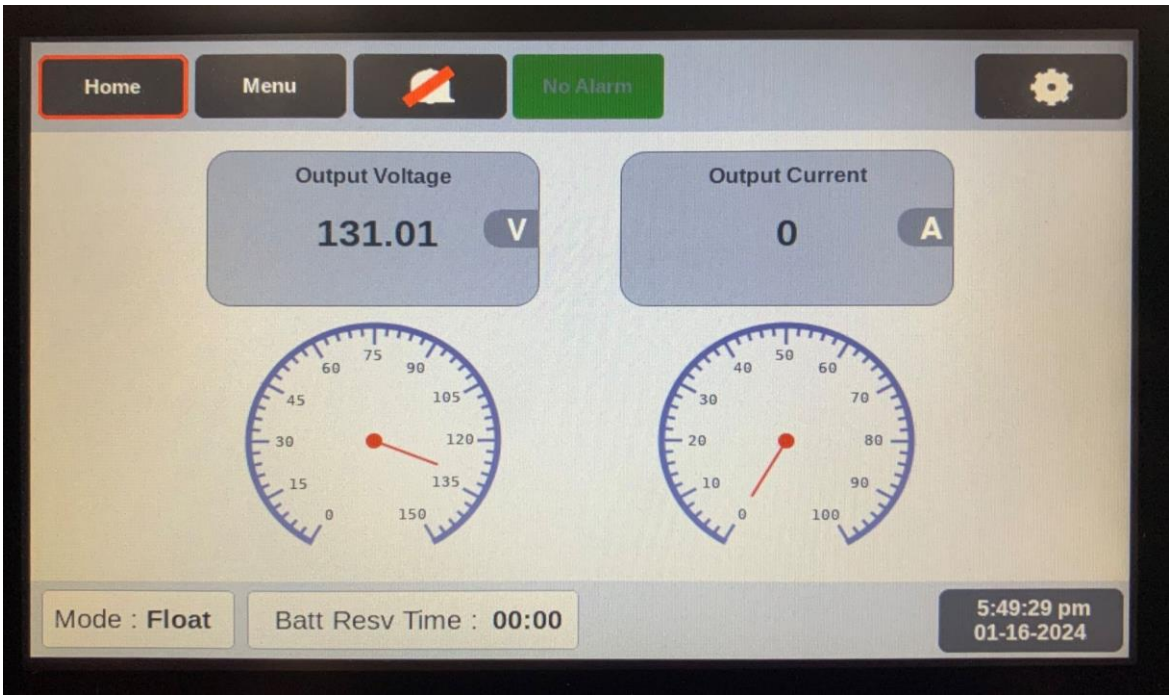
Nebula Controller

Operations Manual



Document: 8600366525P

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1. Nebula Overview

The Nebula controller is the next generation controller to complement the Pulsar Plus Controller family. This manual covers the operations of the Nebula controller for front panel display. Modular hardware and software design of the controller allow for easy customization for specific applications.

Controller provide control and alarm monitoring functions over several communication interfaces including a standard RS-485 digital serial interface that interconnects system rectifiers and other peripherals. Compatible rectifiers include the IP20, IP40, IP50, IP100 series. Local and remote access is provided. Features are factory configured to industry standard defaults to minimize the setup process in the field.

Customer specified factory default configuration is also available.

1.1 Nebula Key Features

- Standard or customer specific factory defaults supported
- Support of more than one factory default
- Power Unit control and management
- Centralized settings for rectifier output set-point voltages.
- Up to 6 IP power modules
- Battery recharge current limit feature
- Low and high temperature voltage compensation
- Independent adjustable slopes
- Step function
- Manual and automatic Boost charging
- Manual, remote test, and periodic discharge test capability
- Reserve time calculations with configurable threshold
- Manual time threshold for pass/fail criteria
- 1-Wire monitoring
- Up to sixteen battery thermal probes (configurable temperature alarm)
- Alarm management of 24V, 48V and 125V_{DC} distribution
- User defined thresholds
- Front accessible touch screen 7” Color LCD with control pad and intuitive menu navigation system
- Voltage Test Jacks for DC bus (Supplied on Output Signaling Unit)
- Available front panel password access feature
- 7” Touch Sensitive Wide Screen Display
- Four front panel LED indicators
- Built-in audible alarm and test feature
- Two dedicated battery monitoring shunts
- USB 2.0
- Modbus serial
- Modbus TCP
- DNP3 TCP/IP
- HTTP
- Event history log
- 16 temperature monitoring probes
- Alarm severity sensitive display back-light, includes LEDs on Nebula controllers
- Digital Inputs
  - (12) dry contacts
- Digital Outputs
  - (12) Form-C contacts
- Communications
- Ethernet ports
  - (2) 10/100/1000 Base-T Ethernet Ports (2 x rear)
  - (1) 10/100 Base-T Ethernet Ports (1 x Front)

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1.2 Configuration

The main “943” microprocessor board comprises the Nebula family controllers. This controller is designed to fit into the Integritas battery Charger. Input and output wiring is connectorized to allow swift disconnect and attachment to and from the unit

The following figure is a block diagram of the basic components of the Nebula IWC NE943A controller.

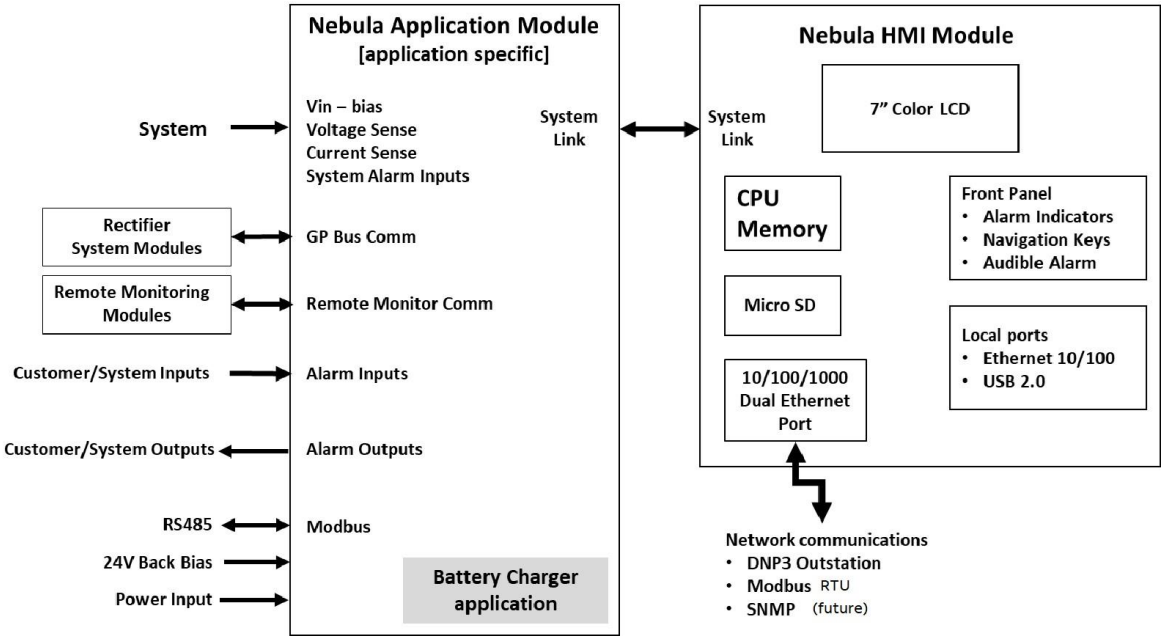


Figure 1 Nebula Architecture

Table 1 Charger Modules

V_{DC}	Configuration	Description	Ordering code
$24V_{DC}$	IP893_24V Controller Module	Integritas Battery Charger, Nebula Hot-Swappable $24V_{DC}$ Controller Module with secure protocols.	1600093508A
$48V_{DC}$	IP943_48V Controller Module	Integritas Battery Charger, Nebula Hot-Swappable $48V_{DC}$ Controller Module with secure protocols.	1600093510A
$125V_{DC}$	IP943_125V Controller Module	Integritas Battery Charger, Nebula Hot-Swappable $125V_{DC}$ Controller Module with secure protocols.	1600093509A
N/A	IP943_IO Module	Integritas Battery Charger, Nebula Input / Output Module (Compatible with all charger voltages).	1600093511A

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1.3 Getting Started – Start-Up and Basic Configuration safety Section

Warning: Review and follow the entire Safety Section before beginning to operate the controller. Observe all warnings and labels on the equipment.

Service, and operate this equipment only by professional, skilled and qualified personnel who have the necessary knowledge and practical experience with electrical equipment and who understand the hazards that can arise when working on this type of equipment.

Hazardous energy and voltages may be present in the system, system components, and on the interface cables that may shock or cause serious injury or death if safety precautions are ignored.

Caution: All tools and test equipment must be insulated in an approved manner.

Proper ESD protection is required in order to prevent ESD damage to the equipment.

The controller is available factory installed into a door/panel of a power system. All functions, inputs, and outputs are described for this configuration. Before power is applied, some basic configurations may be required. Alarm, temperature probes and LAN connections are made through a panel mounted system I/O assembly which is separate from the Nebula controllers' touch display. Pre-wired factory connections have been made between the controllers' display and I/O board assembly. The basic settings will be configured at the "factory default" level unless controller was ordered with a pre-configured set-up.

The display and interface includes tactile buttons for navigating the screen, Including UP, DOWN, RIGHT, LEFT, ENTER and BACK. The display window also includes STATUS LED'S to monitor system status, AC Status, DC Status and Ground Fault Status. These LED'S change from GREEN - YELLOW - RED to cover the severity level of the plant. The display also enters a sleep mode or screen protector mode when no options have been selected for a pre-set period of time.

1.4 Front Panel 7" Touch Display – Nebula

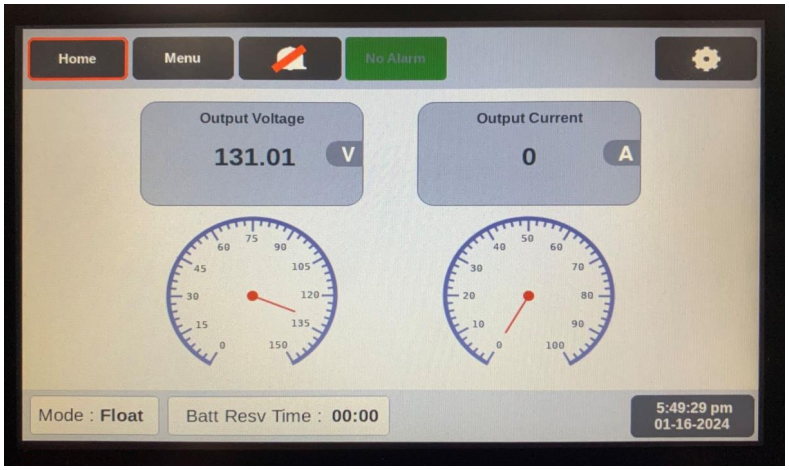


Figure 2 Nebula Front Panel Display

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1.5 Rear Controls

The back side of the controller houses two LAN input connectors (LAN1, LAN2). Pre-assembled system interface cable provides power to the unit and the pathway to the application and alarm I/O boards.

1.6 Nebula Password and Power Reset

The controller display assembly includes two rear panel small round openings in the chassis cover. These allow access to hard-reset switches for the “Password Reset” switch and a “Power Reset” switch.

While pressing the “Power Reset” button, the power will immediately reset.

While pressing the “Password Reset” button, the controller will beep once If button is pressed first time.
If button is hold for ten (10) seconds controller will beep three (3) times to acknowledge the Password Reset.

When enabling either pin button, It’s recommended to use a non-metallic tool to depress the board mounted switches.

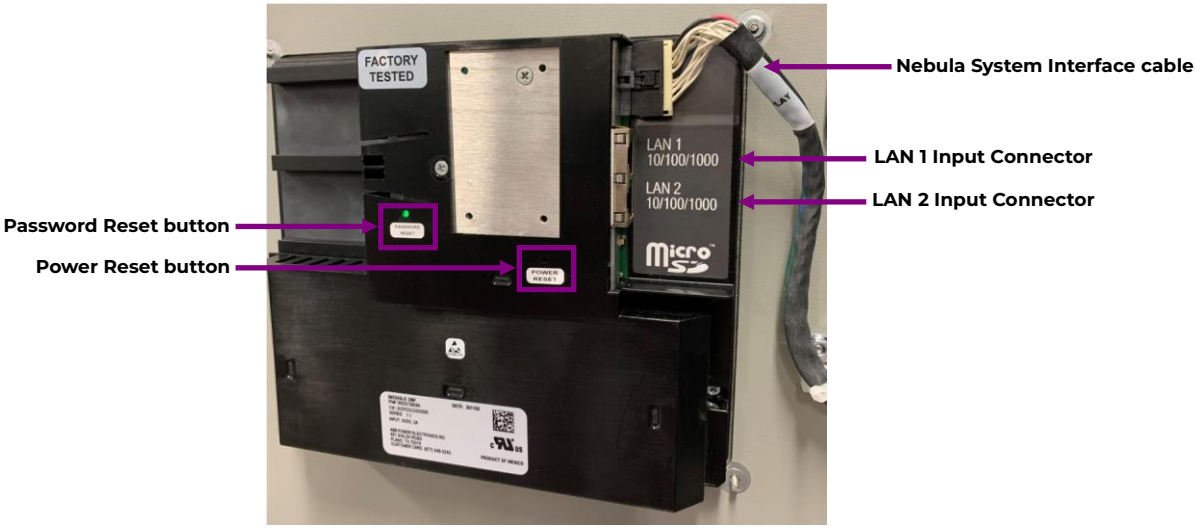


Figure 3 LAN 1, LAN 2 System Interface and Password / Power Reset

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1.7 Front Panel Controls and Status Display

Nebula controller in addition to the touch screen also have six tactile buttons for navigation through a structured menu system. The buttons serve multiple purposes depending on the active screen. These functions are summarized below. The USB port can accept a keyboard, mouse or wireless mouse dongle to aide in entry to the display.

Navigation Controls

Table 2 Front Panel Tactile Control Definitions

Buttons	Description	
	**Parameter Change**	When changing a system parameter, the ▲▼ buttons increase or decrease the value of the parameter.
	**Direction Buttons**	In the Menus, the ▲▼ direction buttons navigate to make a selection. A black box highlighting a menu item indicates that the item has sub-menus.
	**Enter Button**	Enters a sub-menu or confirms a parameter change. From the Home Page only, goes to the top level Main menu.
	**ESC Button**	Goes up one menu level or exits a parameter change without saving.

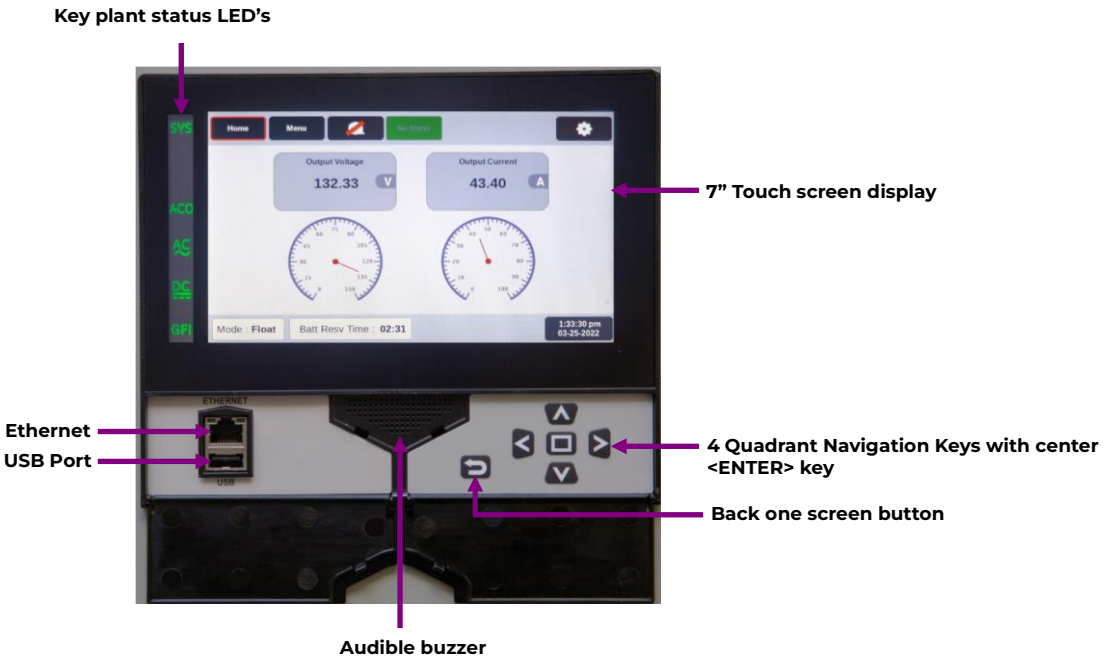


Figure 4 Front Panel Features

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1.8 Nebula Controller Support Assemblies

The Nebula controller system consists of the following components. Each of these modules are included with the control system and are integrated into the power plant selected. All internal wiring between modules are factory wired. Field wired features for battery and alarm monitoring will be defined later in this document.

- Nebula Controller 7” Display and Interface Module
- IP943G Controller Application Board
- IF943G Alarm & Communications I/O Board
- Output Signaling Unit w/ battery monitoring and remote interlock

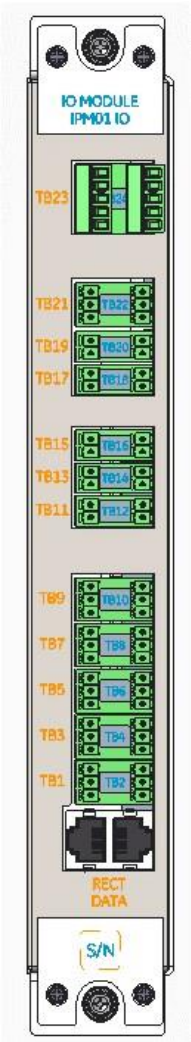
IP943G Application Controller	IP943G Alarm I/ O’s
	

Figure 5 Nebula Controller I/O Ports

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Table 3 Alarm Input and Output Details

Install and Configure Controllers Alarm Connections		
Terminal Block Number	**Signal Number**	**Factory Default Assignment (Signal-Pin #1; Common-Pin #2)**
ALARM OUTPUTS		
TB1	PCR	Power Critical Alarm severity indicator
TB2	PMJ	Power Major Alarm severity indicator
TB3	PMN	Power Minor Alarm severity indicator
TB4	R1	Rectifier Fail (RFA/MRFA)
TB5	R2	AC Fail alarm (ACF/MACF)
TB6	R3	Low Voltage (BD/, VLV)
TB7	R4	Ground Fault (GFI)
TB8	R5	High Voltage (HVSD/HV)
TB9	R6	Multiple Rectifier Fail (MRFA/MFA)
TB10	R7	Check Battery
ALARM INPUTS (“DRY”, NO VOLTAGE, BINARY CONTACT MONITORS)		
TB11	AUX1	AUX1 (AIR CONDITIONER FAIL)
TB12	AUX2	AUX2 (DOOR OPEN)
TB13	AUX3	AUX3 (HIGH EXTERNAL AMBIENT)
TB14	AUX4	AUX4 (LOW EXTERNAL AMBIENT)
TB15		CHARGER/PLANT BATTERY TEST (PBT)
TB16		REMOTE RECTIFIER STANDBY (GSTBY)
TB17	AUX9	(AUXILIARY 9)
TB18	AUX8	(AUXILIARY 8)
TB19	OSAI	(OPEN STRING)
TB20	AUX6	AUX6 (HYDROGEN PRESENT)

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Table 4 System Input Connector

Connect to the Controller		
Connector	**Pin 2**	**Description**
TB11 (IN007)	No Voltage Return	"Dry" No Voltage Binary contact input (default is AUX1 "Air Conditioner Fail")
TB12 (IN008)	No Voltage Return	"Dry" No Voltage Binary contact input (default is AUX2 "Door Open")
TB13 (IN009)	No Voltage Return	"Dry" No Voltage Binary contact input (default AUX3 "High External Ambient")
TB14 (IN010)	No Voltage Return	"Dry" No Voltage Binary contact input (default AUX4 "Low External Ambient")
TB15 (IN006)	No Voltage Return	"Dry" No Voltage Binary contact input (default "Plant Battery Test (PBT)"
TB16 (IN005)	No Voltage Return	"Dry" No Voltage Binary contact input (default "Remote Rectifier Standby/Emergency Power Off")
TB17 (IN001)	24V Source	"Dry" 24V Biased Binary contact input 24V Source (default "AUX9 Auxiliary 9")
TB18 (IN002)	24V Source	"Dry" 24V Biased Binary contact input (default AUX8, "Auxiliary 8")
TB19 (IN004)	24V Source	"Dry" 24V Biased Binary contact input 24V Source (default OSA1, "Open String")
TB20 (IN003)	24V Source	"Dry" 24V Biased Binary contact input (default AUX6, "Hydrogen Present")
TB21	+24V DC Return	+24V Alternative external $24V_{DC}$ back bias input for controller.

Table 5 Output Alarm Connector

Connect to the Controller			
Pin # Wire Color	**Signal Name**	**Pin #2**	**Nebula Display Defaults**
1 (BL)	PCR	Common	Power Critical Alarm (PCR)
2 (O)	PMJ	Common	Power Major Alarm (PMJ)
3 (G)	PMN	Common	Power Minor Alarm (PMN)
4 (W)	RFA/MRFA	Common	Rectifier (RFA/MRFA)
5 (BK)	ACF/MACF	Common	AC/Multiple AC Fail (ACF/MACF)
6 (BL-W)	BD/VLV	Common	Battery on Discharge, Very Low Voltage (BD, VLV)
7 (O-R)	GFI	Common	Ground Fault Interrupter (GFI)
8 (G-W)	R5	Common	Surge Protector Device (SPD, DC & AC)
9 (W-R)	R6	Common	Battery Test Active (BTA)
10 (BK-R)	R7	Common	Check Battery

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Connect to the Controller

1-Wire Temperature Probe Interface

TB22 is a standard Phoenix Contact receptacle provided for making connections to “1-Wire” devices such as QS873 VT-Probes (up to 16). Standard cable assemblies have been designed and must be used for applications involving the QS873 VT-Probes. These cables provide simple plug-n-play from the controller to a QS873A probe. Consult the section on “1-Wire” peripherals for further information. Following are the present pin assignments for TB22. See QS873A Voltage / Thermal Probes section for additional information.

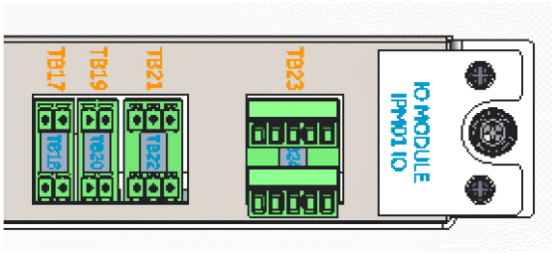


Figure 6 Connection for one Wire at TB22

System Input Connector

System Interface connector provides connections to the Application and Alarm I/O System Boards.

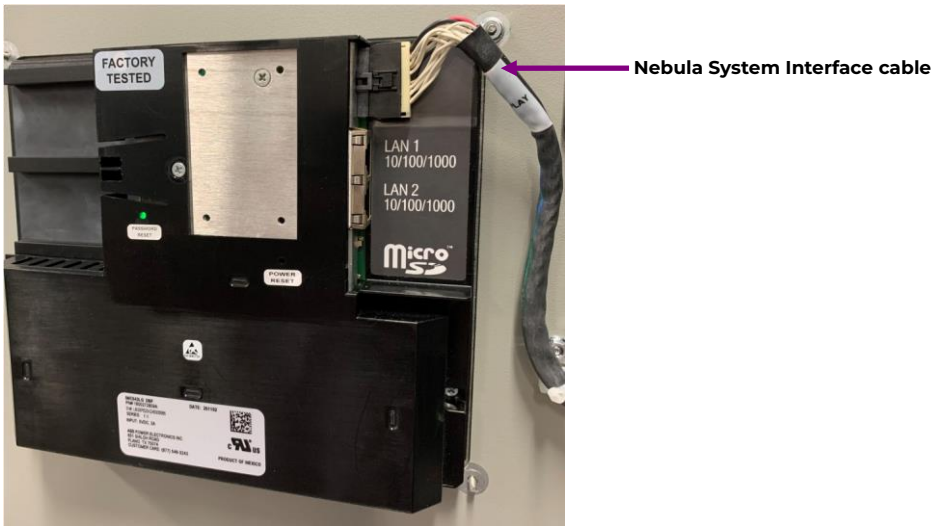


Figure 7 System Interface Cable Connection

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Connect to the Controller

Network (LAN) Connection

The controller provides a standard 10/100Base-T Ethernet connection for a LAN port connection. The connector is a standard RJ45 shielded receptacle connection for standard Cat-5 cable connection between the controller and the LAN. This port has two main modes of operation: Server mode and LAN mode (Static and DCHP Client). The factory default configuration for the port is operation as a DHCP Client.

In DHCP Server mode the port can be used as a local Craft interface. In this mode, a laptop can be directly connected to RJ45 connector with standard straight-through Cat-5 cable. A standard web browser can then be used to access the controller by typing in network address **http://192.168.2.1**. All controller's in DHCP Server mode use this same address. A connection must never be made between the controller and LAN while the controller is in Server mode.

In Static or DHCP Client modes of operation the controller is to be configured with an IP address as well as other network parameters. In these modes of operation, the power system can be remotely monitored and accessed over the network. Permanent connections between the controller and LAN must use a Shielded Cat-5 cable and be routed according to appropriate building code. Following is the pin assignment for the connection:

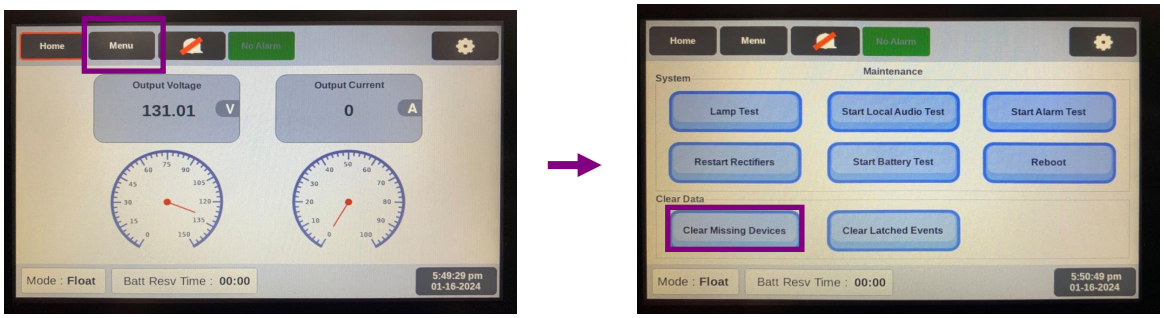
Table 6 RJ45 Connector Pin Layout

Pin #	Signal Name
1	TX+
2	TX-
3	RX+
4	
5	
6	RX-
7	
8	

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1.9 Controller Setup

Once all relevant installation procedures are performed as defined in respective system product manuals and documentation, the system is ready to be powered up.

Initial Startup of the Controller	
Step	**Action**
1	Verify all connections are complete before applying power. See document 8600092587P QSG.
2	If equipped, place all external battery disconnect switches into their ON positions prior to applying power.
3	Apply power to the power system.
4	After approximately one minute, all LEDs on all components including rectifiers and the controller control boards, aux displays, and remote voltage monitor modules should be green. If this is not the case, from the home screen, press Menu > Maintenance > Clear Missing Devices. Alarm conditions should clear. If all LEDs still aren't green, review the installation procedure and refer to the troubleshooting section. The controller display will indicate "NO ALARMS", system float voltage, total load current, and system operating mode. LEDs and back-light will be green for no alarms.  **Figure 8 Clearing Missing Devices at Start Up**
5	Check the voltage reading on the controller display to verify that it complies with the system float voltage setting. The controller is factory configured with a rectifier Float voltage set-point of 54.48V for 48V rectifier systems and 27.24V for 24V rectifier systems and 132.3V for +125V. Note: If Slope Thermal Compensation (STC) is active or if the connected batteries are not fully charged, the bus voltage may be different than the set-point. If possible, open the external battery disconnect prior to making measurements to eliminate these effects. If QS873 VT probes are installed in the system. STC may be active. This will be indicated by the Plant Mode "FLOAT – TEMP COMP". STC can be manually turned off by selecting the "Search" option and entering "Slope Temperature Compensation". Change the "Enable" option to "Disable" and press Accept. If this is done, be sure to Enable the feature before leaving. 

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The Nebula controllers are a multiple micro-processor based assemblies with volatile and non-volatile memory. These assemblies have been factory preconfigured with standard or customer specific configuration default settings for all features and thresholds. These systems are shipped from the factory already having the controller installed, configured, and tested for the system it resides. Installation and much of the configuration of the system controller may not be required. The date and time is generally set at factory test to central standard time zone.

Controllers with customer specific configuration defaults are also available. These units will be assigned a unique apparatus code for ordering and management. A configuration template is available to facilitate this process. OmniOn Power Systems predefined industry standard factory defaults are utilized for the Nebula controllers. Although the configuration default files are permanently stored until they are replaced, all configurable parameters and thresholds can also be reconfigured or modified as needed in the field. These items are then stored in non-volatile memory. However, a user can always return to factory programmed configuration by initiating the “Loading Defaults” operation for a specific battery type.

Standard float values, alarm thresholds, and other functions are set as defaults for each of these battery types that can be modified in the field as desired. The controller also provides a list of industry standard batteries that are linked to these technologies and share the standard defaults. Batteries can be added or deleted from this list as required through the use of the controller’s remote interfaces.

The controller has been factory pre-configured with the generic Valve-Regulated Lead Acid (Valve-Reg) battery as the standard configured battery model. All associated configuration items for the “Valve-Reg” battery type are utilized. Thus, the default system float voltage setting and alarm thresholds are configured assuming the power system contains VRLA batteries that require an uncompensated float voltage of +54.50V (48V) or +27.25V (24V) as observed during the power-up procedure.

Basic configuration items such as the battery type, float set-point, date, and time, and site ID can be reconfigured in the field from the front panel or through remote means. To change these items do the following:

The Basic items to configure for basic system operation are:

- Float Set-Point (And associated alarms described in next section)
- Battery Type and number of strings
- Date
- Time
- The controller is designed to support multiple battery technologies. These Generic technologies include:
- Valve-Regulated Lead Acid (Valve-Reg)
- Flooded Lead Acid (Flooded)
- Lithium Metal Polymer (Li-LMP)
- Nickel-Cadmium (Ni-Cd)

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1.10 Front Screen versus Web Interface

The controller has an integrated 10/100/1000 Base-T port that supports standard protocols over TCP/IP like FTP and Telnet. It also has an integrated HTTP web server that serves up web pages to remote PCs using standard web browsers. Once properly connected to the network, simply typing the IP address assigned to the controller in the browser will serve up the log-in screen. The 24 support web pages provide the majority of the functionality supported by EasyView and the T1.317 interface. The best way to learn the operation and content of these interfaces is through use. The basic operations performed via 7" front panel screens including a Quick Plant Configuration screen will be described below. Following are sample screens.

Note: web pages are updated for functionally and aesthetics. Thus, some of the screens shown may be slightly different than those served up by controller. The features available through the Webpage interfaces allows for greater flexibility in editing the key systems of system than what is permitted via the direct front access panel. It is due to the addition of user names and password requirements made through the webpages. It is implemented as a security feature to provide a limited access to users without passwords who are reviewing the on-site systems performance.

1.11 Ethernet Port

The web interface can be accessed remotely over the LAN or with a direct connection from a local PC. Once logged in the interface is the same. The following describes configuring the port as a local craft port. This mode of operation allows a user to connect an external craft PC directly to the port and use the PC's standard Web browser to locally access the system. This craft port is supported by the controller operating in DHCP (Dynamic Host Configuration Protocol) server mode. While the craft port is operating as a DHCP server, it must never be plugged into the building or surrounding LAN.

To access the system using the craft port follow the following basic procedure:

Find and take note of the controller's working IP (WIP) on the front panel display by opening the slide-open window by clicking on  and selecting "Network Settings". Working IP Address: _____.

Note: If the Port is not configured as a Server it will not have the correct IP address. To use the Ethernet port locally as a Craft port it needs to be configured as a DHCP Server. DHCP Server operation can be validated by navigating the menu to "Network Settings". Scroll down to view the port's present configuration.

If it is not in DHCP Server mode, make sure the Craft port is not plugged into a LAN connection and re-configure the DHCP setting from the front panel to be Server. This is parameter is found on the front panel display by opening the slide-open window by clicking on  and selecting "Network Settings".

DHCP Setting: _____.

Note: when performing this operation from the front panel, the controller must be rebooted by removing and reapplying power to the unit so that it can accept the new Ethernet port configuration. This can be done by removing and re-inserting the slot controller or by removing and reattaching the power connection at J9 on the door-mounted controller. The rebooting process takes approximately two minutes. Validate the change to server mode at _____.

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2. Front Panel Operation

This section describes the controller features, functions and alarms from perspective of a user utilizing the front panel display.

2.1 Home Page

The Home Tab opens initially upon signing onto the Nebula controller. The Home screen provides wide variety of plant features including:

- Home Access Icon allows for a quick return to the Home page from within the menu structure
- Plant Output Voltage in V_{DC} and "Gas Gauge" style format
- Plant Output Current in A_{DC} and "Gas Gauge" style format
- Plant mode (Float or Boost)
- Battery Reserve Minimum value
- Alarm Cutoff button
- Alarm Status [**No Alarms**] [**Alarms**]
- Quick Config Control  Icon provides access to updates to plant configuration.
- Full Features Menu
- Date / Time

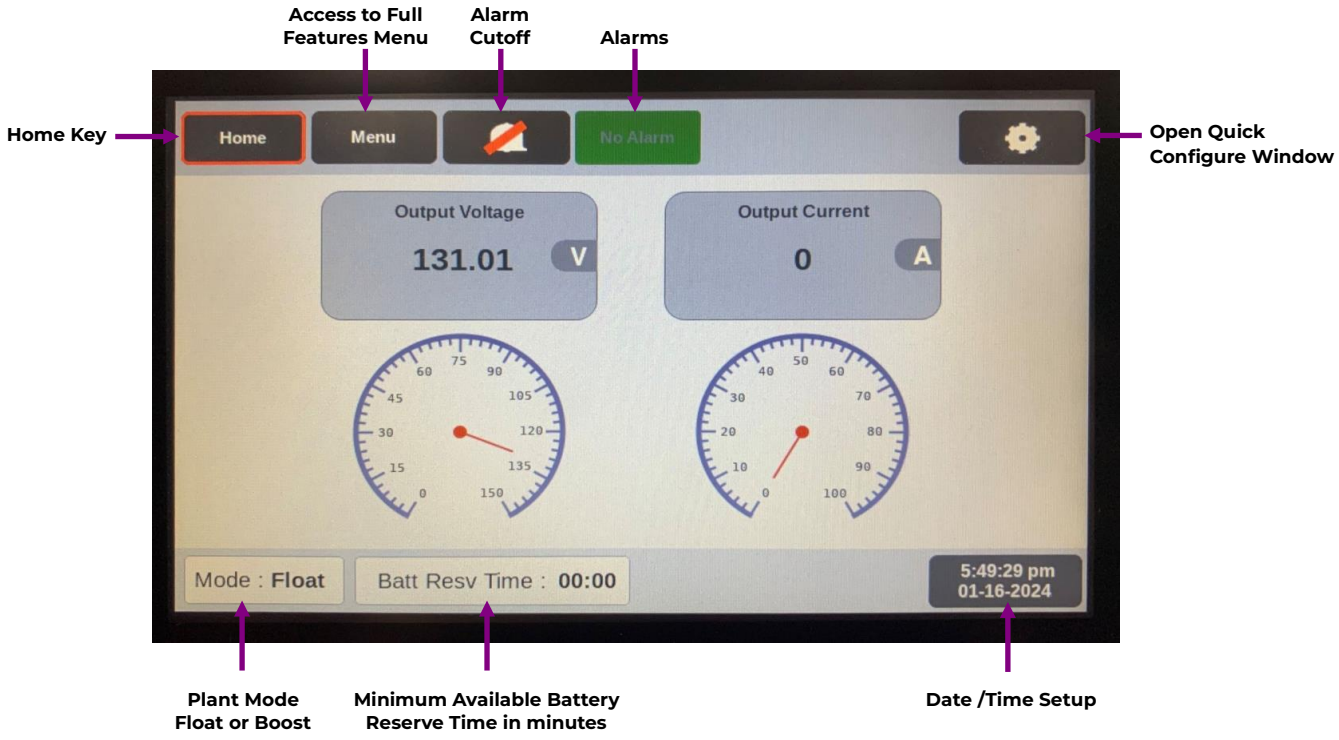


Figure 9 Front Panel Home Page

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2.2 Features Menu Options

The Nebula Controller includes a icon's of each of the controllers' available features when selected by the front Nebula controller screen. Click "menu" to open the window.

Each features "TAB" opens to a new table of information related to each section. Each section reports detailed information relative to its' topic as well as providing a path to revise the default data.

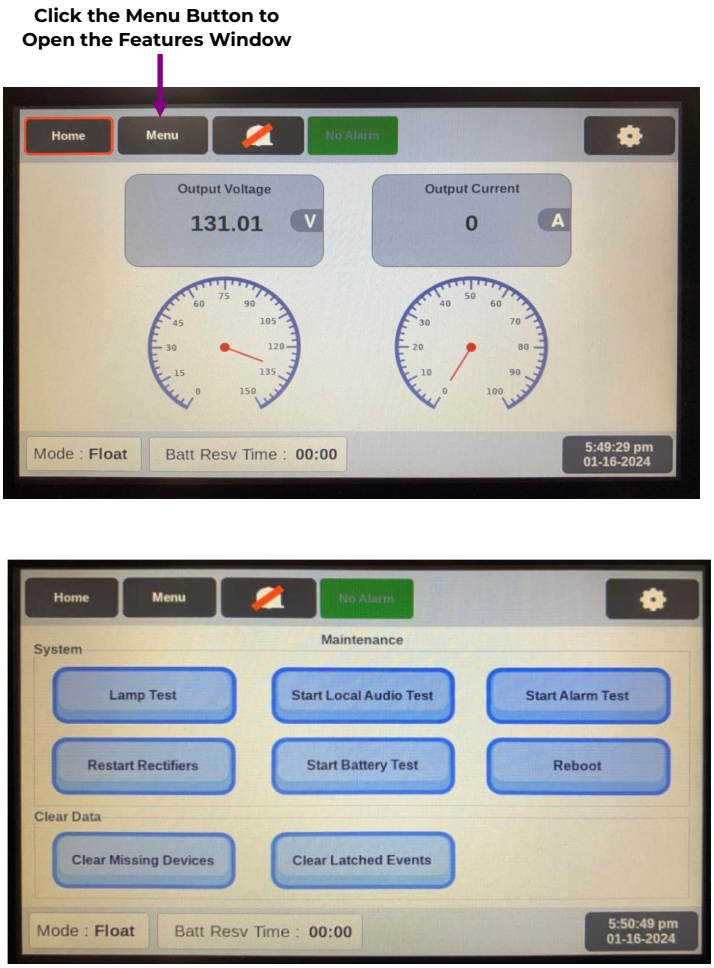


Figure 10 Front Panel Accessible "Menu" Features List

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2.3 Rectifiers Option

Selecting the Rectifiers TAB from the list of options opens the following Nebula display screen. The screen shows the following details for each configured and operating rectifier module.

- Shelf position equipped with an operating module
- Rectifier modules recorded output voltage
- Rectifier type by model number
- Rectifier modules recorded output current
- Rectifier capacity in amperes
- Rectifier Operating State
- On / Off / Stand-by

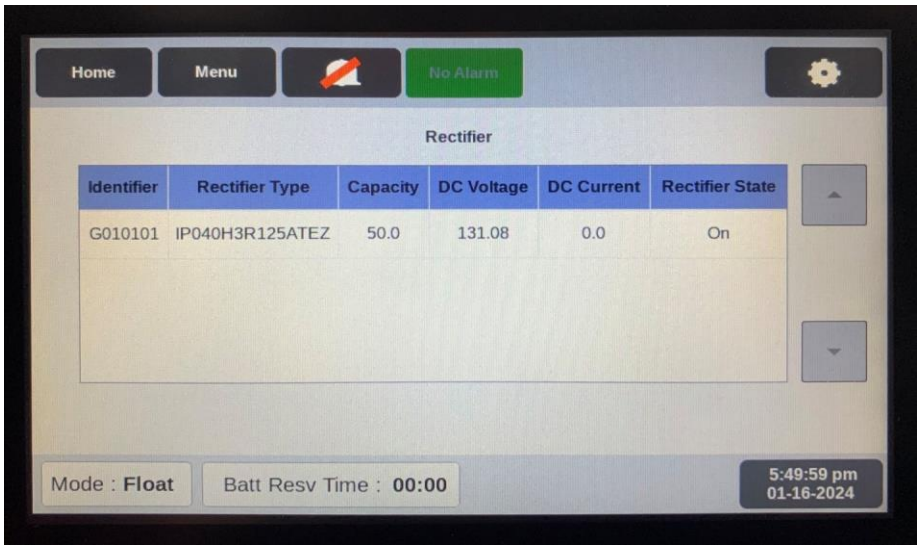


Figure 11 Rectifiers Screen from Front Panel

The information provided on this screen is "READ ONLY". There are no user changes that can be made from this screen. While viewing this screen, all system functions continue to be monitored and displayed on the screen in real time.

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2.4 Shunts Option

Select the Shunts TAB to display the window shown below. This screen provides a listing of the following shunt details:

- Shunt Identifier for Load Shunts “DCMC1”, “DCMC2”
- Shunt Type: Load, Battery, None
- Total kWh Rating
- Shunt mV Rating (typically 50mV, 100mV)
- Shunt Ampere Rating
- State

The IWC has the capability of monitoring up to four (4) shunts. The Total kWh reading is a calculated value based on output power over the operating time of the system. The information on this screen is read only. The information on this page is continually updated.

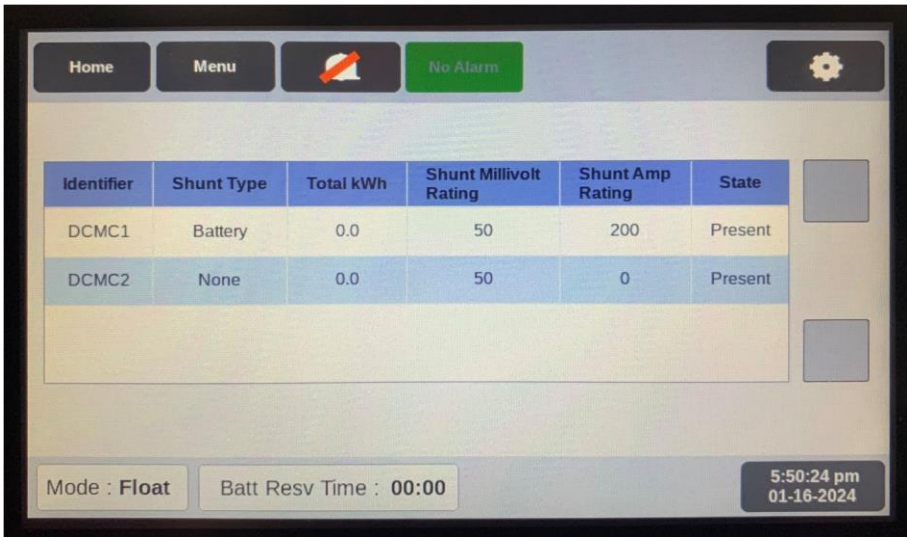


Figure 12 Shunt Options Display Screen

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2.5 Batteries Option

Select the Batteries TAB to display the screen shown below. The screen show a listing of each battery attached to the plant. The information includes:

- Battery Identifier for each connected battery string
- Real-time measured battery current (Charge / Discharge)
- Battery String Description field
- State of the battery string. (None, Present)

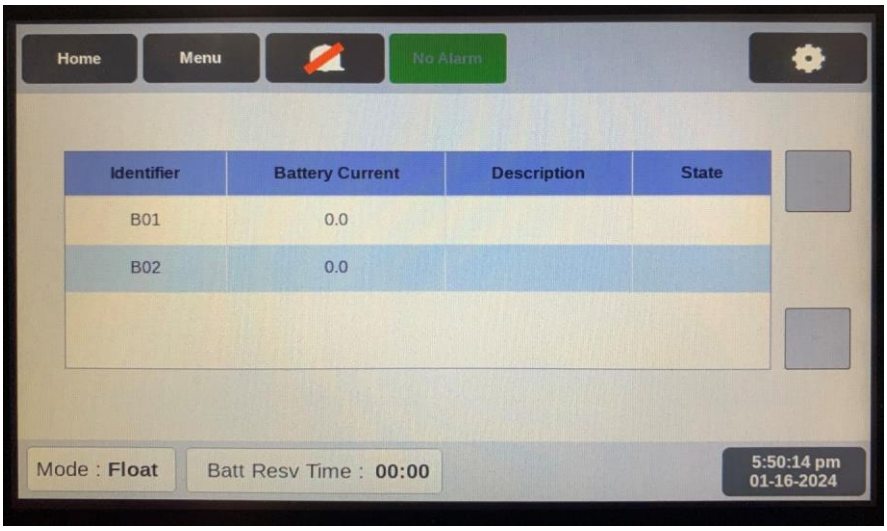


Figure 13 Front Screen Access to Battery Plant Information per String

The information reported on this page is “Read Only”. This page does not provide for user battery configuration from this front screen.

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2.6 Network Option

Select the Network TAB to display the screen below. Network access is factory preset to “0” as the default mode. If not operating in the DHCP server mode, make sure the port is not plugged into a LAN connection and reset the DHCP setting to LAN. Operate with the Dynamic Host Configuration Protocol in client mode when user want the DHCP to issue IP addresses.

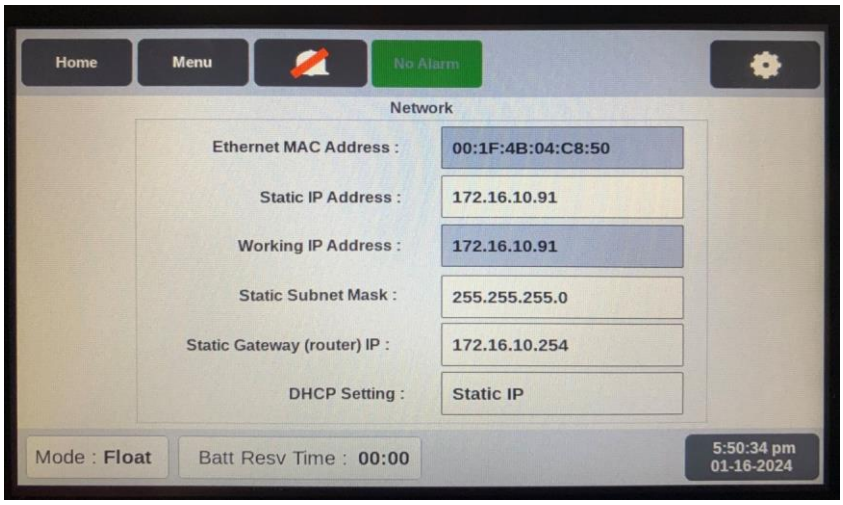


Figure 14 Network Settings Screen from Front Page Access

The Network settings are user edited from the front panel. The Ethernet MAC Address and Working IP Address settings are “Read Only”.

Ethernet MAC Address - MAC addresses are primarily assigned by device manufacturers, and are often referred to as a burned-in address. They are in the format, hh:hh:hh:hh:hh:hh.

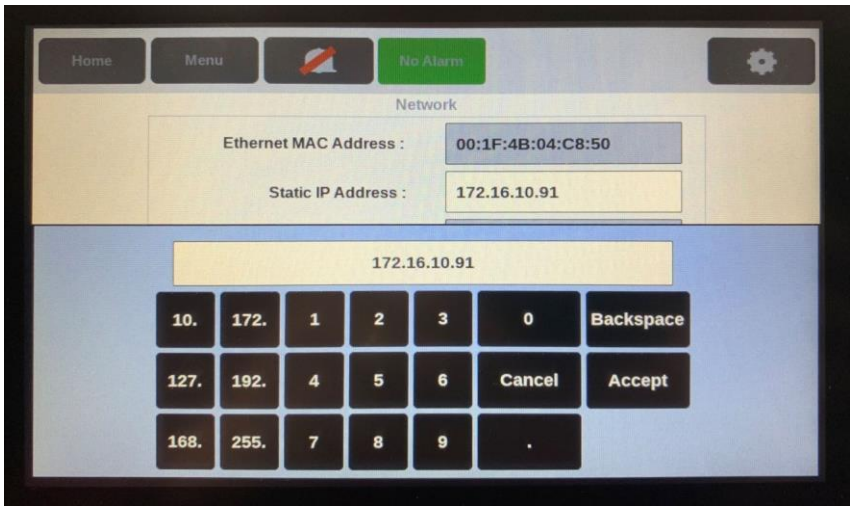


Figure 15 Network Address Entry

The **Working IP Address** is the DHCP assigned or Static IP address. This is generated in the format xxx.xxx.xxx.xxx. This is a “read only” window.

The **Static Subnet Mask** can be entered in the format, xxx.xxx.xx.xxx. Note: Static Subnet Maskis not used if DHCP enable. Hover mouse over the address area to access the address slide-open address window. Select the appropriate address or ‘...’ for no address and press <**Accept**> to enter selection.

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The Static Gateway (Router) IP can be entered in the format, xxx.xxx.xx.xxx. Note: Static Gateway (Router) IP is not used if DHCP enable. Hover mouse over the address area to access the address slide-open address window. Select the appropriate address or '...' and press <**Accept**> to enter selection.

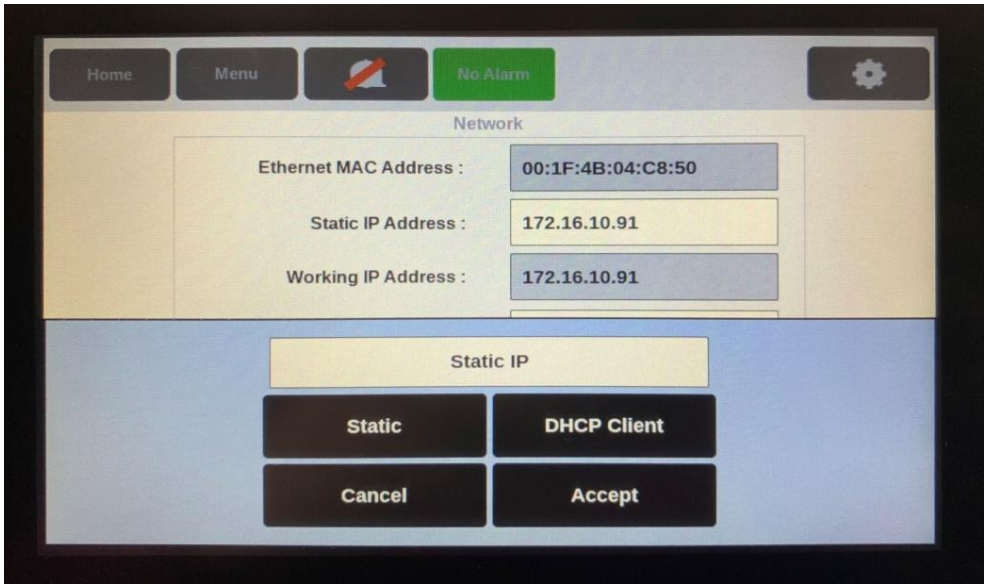


Figure 16 State Gateway (Router) IP Address Entry

The DHCP Setting window opens to allow selection of Static, or DHCP client or "..." for no setting. Select option and press <**Accept**>. When all Network setting have been updated, click "Execute Network Changes" to store entries.

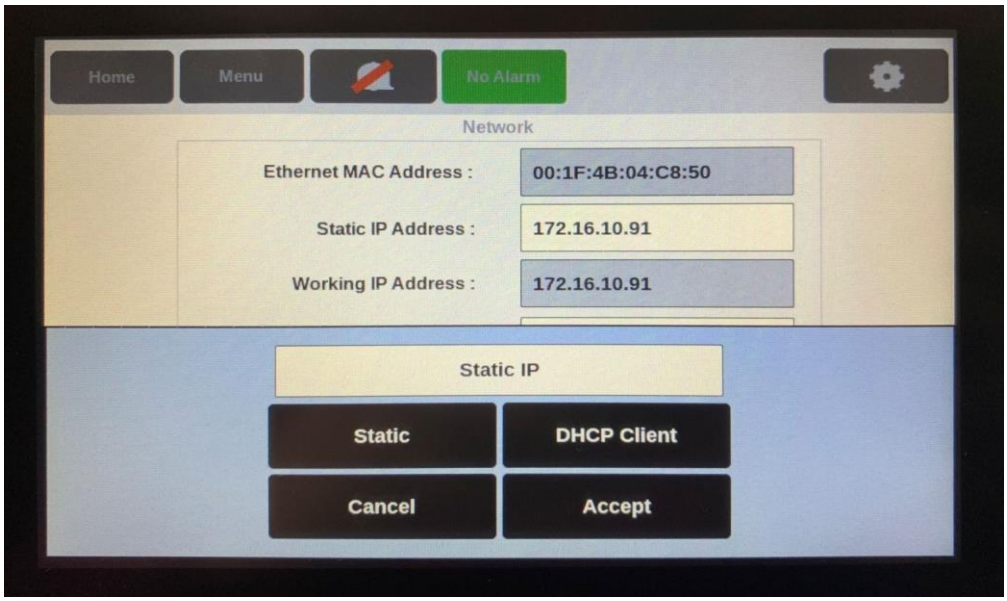


Figure 17 Client Settings and Execute Network Change Command

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2.7 Maintenance Option

Selecting the Maintenance feature allows local or remote access to Control/Operation commands. These include Lamp Test, Start Local Audio Test, Start Alarm Test, Restart Rectifiers, Start Battery Text, Reboot, Boost, Clear Missing Devices and Clear Latched Events. Test parameters for these tests may be edited through the webpage interface.

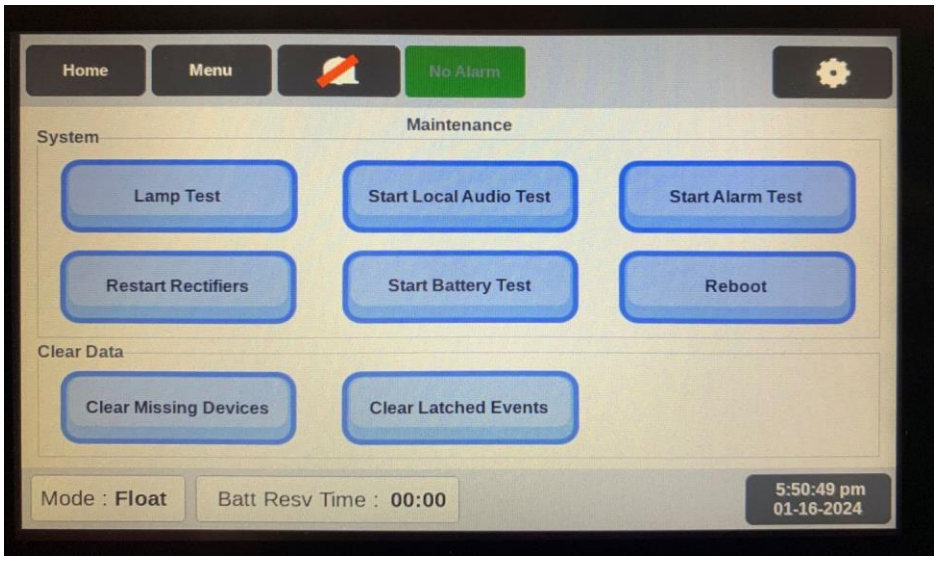


Figure 18 State Gateway (Router) IP Address Entry

Lamp Test: Temporarily illuminates and color cycles through all status indicators of attached rectifiers, distribution monitoring and control modules and the system controller.

Restart Rectifiers: Provides the ability to restart All system serial controlled rectifiers and/or converters at once. Provides the ability to individually reset only rectifiers or converters at a time. This operation does not affect rectifiers, converters, and other system devices that are already functioning.

Boost: Entering the rectifiers to Boost Mode.

Start Alarm Test: Provides ability to initiate an alarm test on a specific user selected output relay or all output relays. Alarm relays are asserted at the configured alarm interval.

Start Battery Test: Initiates the manual battery test feature. A stop battery test operation is displayed to interrupt the testing and return the unit to normal operation. The manual battery test utilizes the configured test duration and a system bus voltage threshold to represent the end of reserve.

Cutoff Audible Alarm: The controller has a built-in audible alarm and test feature. This alarm is active whenever a Critical, Major or Minor alarm is detected by the controller. The audible alarm can be silenced by the front panel or by remote controls. Once the audible cut-off is selected the alarms present in the system are listed. An indicator on the default front panel screen is provided to inform that the audible alarm cutoff is active. The audible alarm can also be turned-back on following similar procedures.

Reboot: This command begins a reboot of the Nebula Controller. When executed, the display returns.

Clear Latched Events: This command is used to clear latched events. These events include communication failures, missing rectifiers, missing thermal probes, missing voltage monitoring module, distribution fuses, and loss of redundancy alarm.

Clear Missing Devices: This command is used to clear missing or removed equipment from the system. It evokes the power system command, USL “Uninstall Missing Equipment”.

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2.8 History Option

This area of the menu system contains event history information. The controller works on a first record in first record out once the record size of a specific field is reached. The following system history logs are available:

Table 7 Controller History Log

Alarm History	Chronological view of the last 256 alarms and events that have occurred since the last time the history log was cleared.
BD History	Chronological view of the last 16 battery on discharge (BD) events since the last time the history log was cleared.
Boost History	Chronological view of the last 16 times the system entered boost mode since the last time the history log was cleared.
Rectifier History	Chronological view of the last 256 rectifier alarms and events that have occurred since the last time the history log was cleared.
Local Port History	Chronological view of the last local terminal logins that have occurred since the last time the history log was cleared. The number of these events counts towards the total number of Modem, Network, PIN, and Local port events which can be up to 48 events.
PIN History	Chronological view of the last Front Panel access that required password entry. The number of these events counts towards the total number of Modem, Network, PIN, and Local port events which can be up to 48 events.
Network Port History	Chronological view of the last Network access events that have occurred since the last time the history log was cleared. The number of these events counts towards the total number of Modem, Network, PIN, and Local port events which can be up to 48 events.

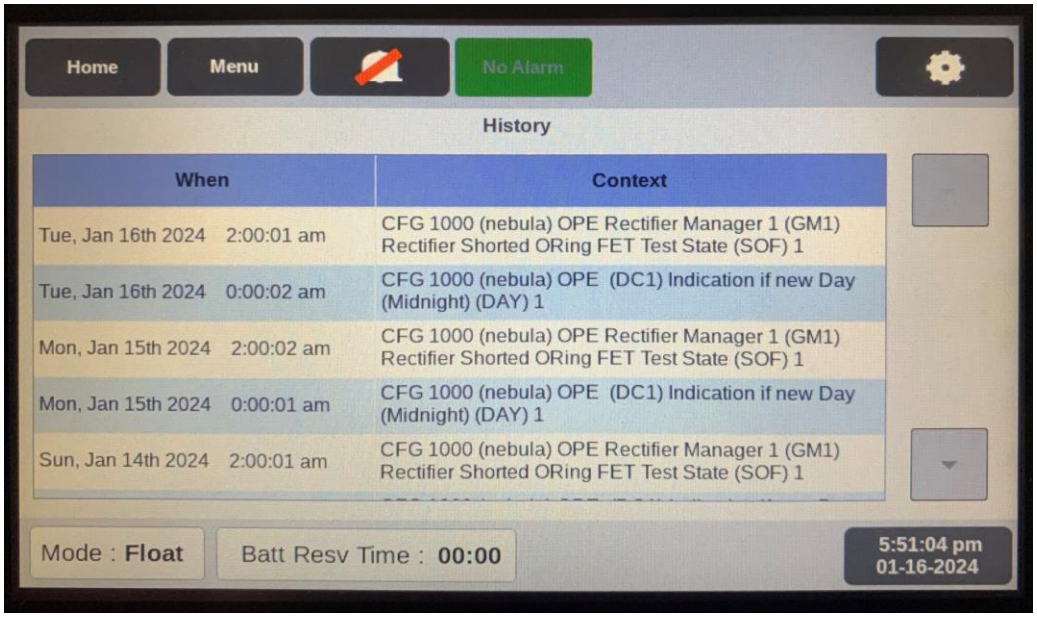


Figure 19 Front Panel Screen History Screen

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2.9 About

This webpage and front panel view show the current software version in operation on this Nebula Controller.

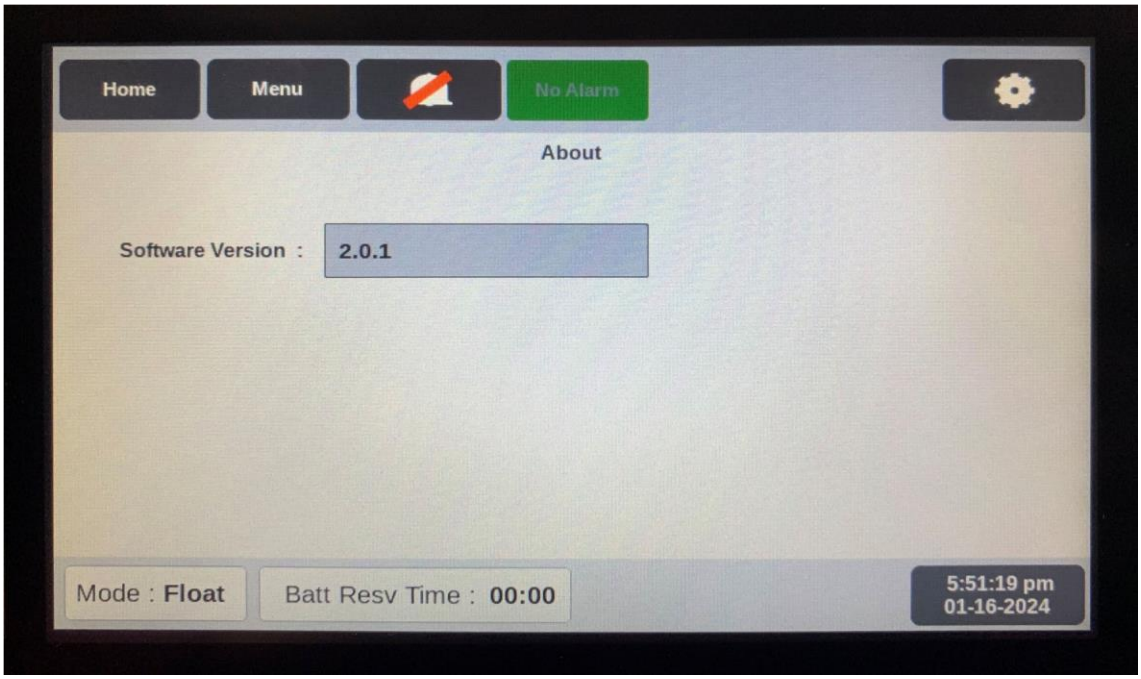


Figure 20 Software Version "About" Screen

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2.10 Quick Plant Configure

Click on the “gear” icon to see the quick plant configuration view. These are the settings that can be quickly modified from the front panel. All other setting are done from web browser interface.

Use the scroll buttons on the right to scroll down and see additional settings that can be modified from the quick panel config view.

- Output Float V_{DC} setting
- Output Boost V_{DC} Setting
- Rectifier HV Float Shutdown V_{DC}
- Rectifier HV Boost Shutdown V_{DC}
- BOD Voltage Float V_{DC}
- BOD Voltage Boost V_{DC}
- LV Alarm Float V_{DC}

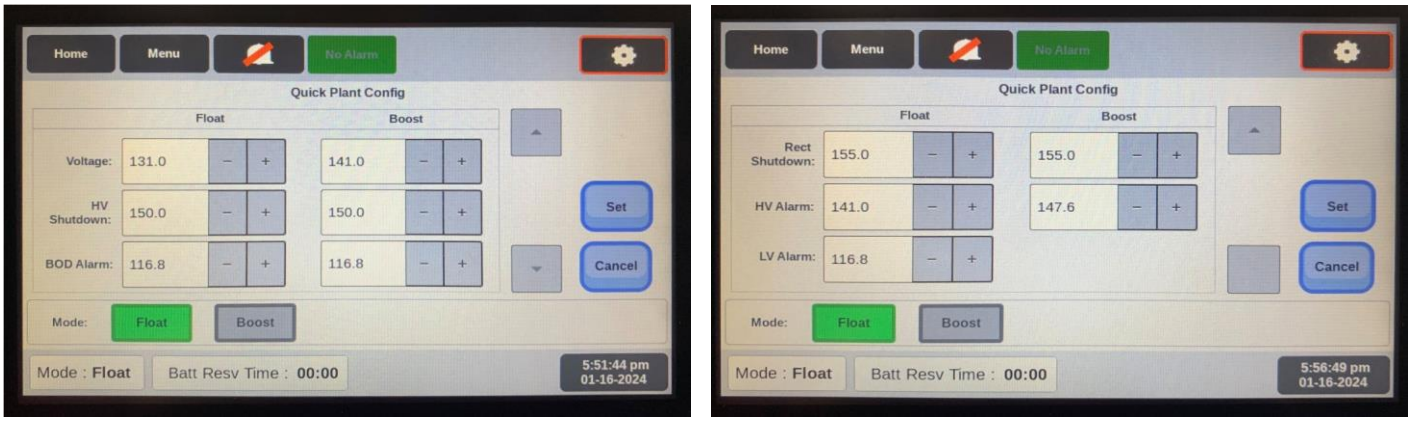


Figure 21 Quick Plant Config Settings

To assist in setting via the front panel and webpage, a slide-open keypad opens to allow key stroke entries from the screen touch points or via an external mouse. When values have been selected, press <**Accept**> to save and load the new setpoints.

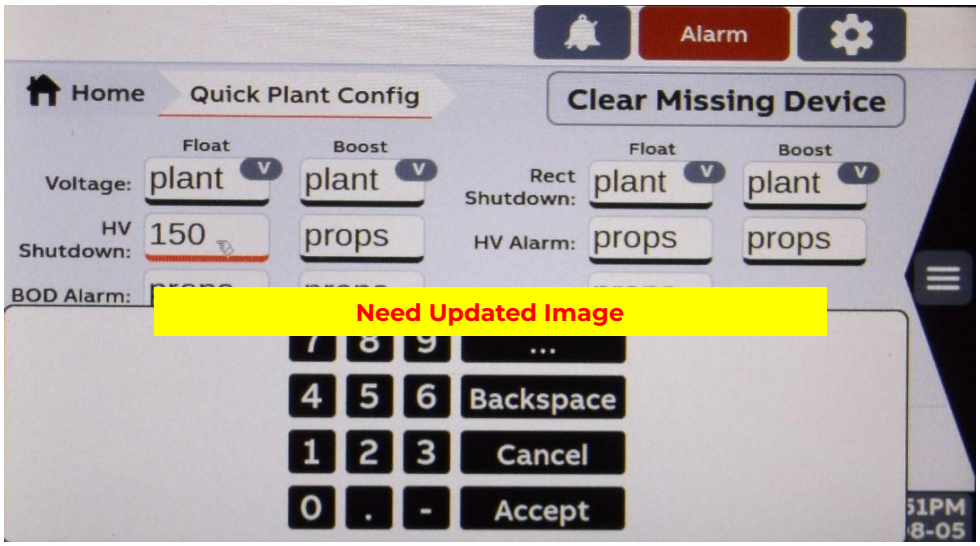


Figure 22 Quick Plant Config - Onscreen Keyboard

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2.11 Date & Time Setup

The user can update the date and time settings both from the webpages or through the front touch screen interface. Click and touch the date / time icon area of the screen to access the editing window. From this window user have access to six (6) settings options for date / time. These include:

- Direct time entry via keyboard / front screen interface
- Slide bars adjusting for hours and minutes
- Select the date from the calendar page selections
- Enter the date / time format style
- Enter the NTP location for region

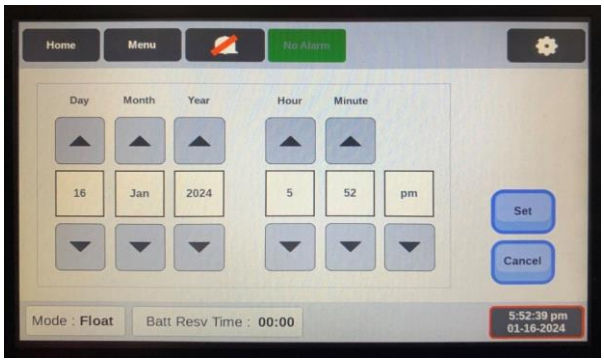


Figure 23 Direct Time & Date Entry - Front Panel



Figure 24 Direct Time & Date Entry - Web Page

Place the cursor over the “Time” to open the slide-open entry keyboard. Enter the correct time and click <**Accept**> to confirm entry.

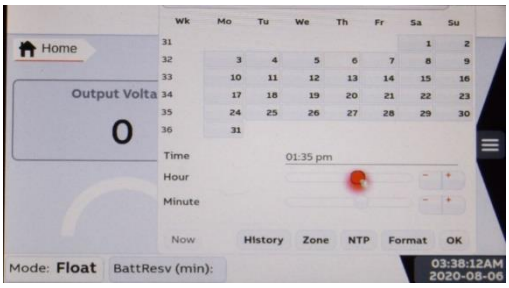


Figure 25 Hours/Minutes Slider Bar Time Entry - Web Page

Touch the mouse or finger to the “Hour” and then “Minute” Slider-bar to adjust to the correct time. The slider hi-lights to confirm selection of Hour and Minute function.

Press the <**Accept**> button to confirm selection.

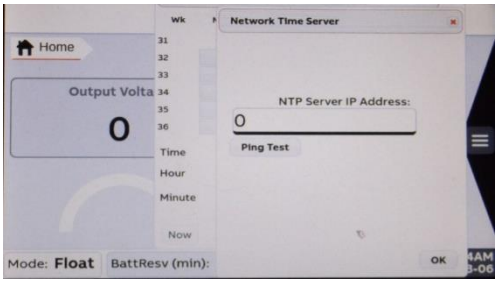


Figure 26 Hours/Minutes NTP Server Mode - Web Page

The NTP (Network Time Protocol) feature is a networking protocol for clock synchronization between computer systems over packet-switched variablelatency data networks. Several services exist that offer NTP addresses. Google Public NTP is a free, global service can be used (216.239.35.0). User can PING the NTP site to confirm the server is connected to the network. Latency between user and server or device can be determined by user.

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The controller reports the current date and time on both the webpages and front panel display in the lower right screen corner location. A sample of that view is shown to the right. When the user selects the Date / Time option from the features selector tab, provides a mouse click or touches the date/time screen icon the option to adjust these parameters is opened. The first window viewed allows for resetting the month, date and year function. Select the proper month and date from the calendar page opened below or use the slider buttons provided beside the month to move through the selections. Choose the proper date. Click "OK" to set the date. Setting the correct time can be done by several methods. Time can be entered directly or by using the "**Hours**" and "**Minutes**" slider bars to set the time and then select "OK". Selecting "**ZONE**" opens a time zone application, allow to choose specific time zone

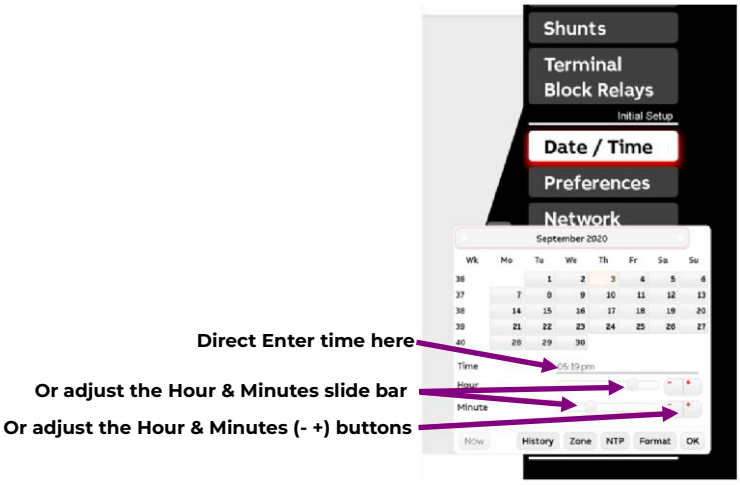


Figure 27 Options for Editing Current Time - Web Page

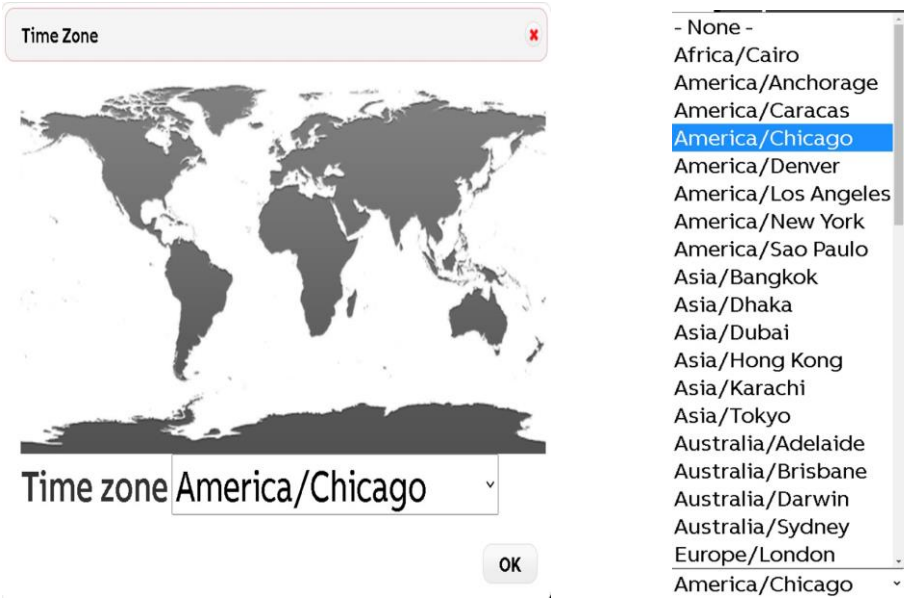


Figure 28 Time Zone Option - Web Page

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2.12 Plant “Mode”

From the main Home screen, pressing the “Mode: Float” icon on the bottom left screen jumps the user directly to the Quick Plant Config screen. The Mode previously selected was “Float” and is shown outlined in Green. Pressing “Boost” would execute the Boost Mode command and place the unit into a higher output voltage. In Boost mode, the charging of the battery is expedited by raising the system voltage to Boost level for a set time.

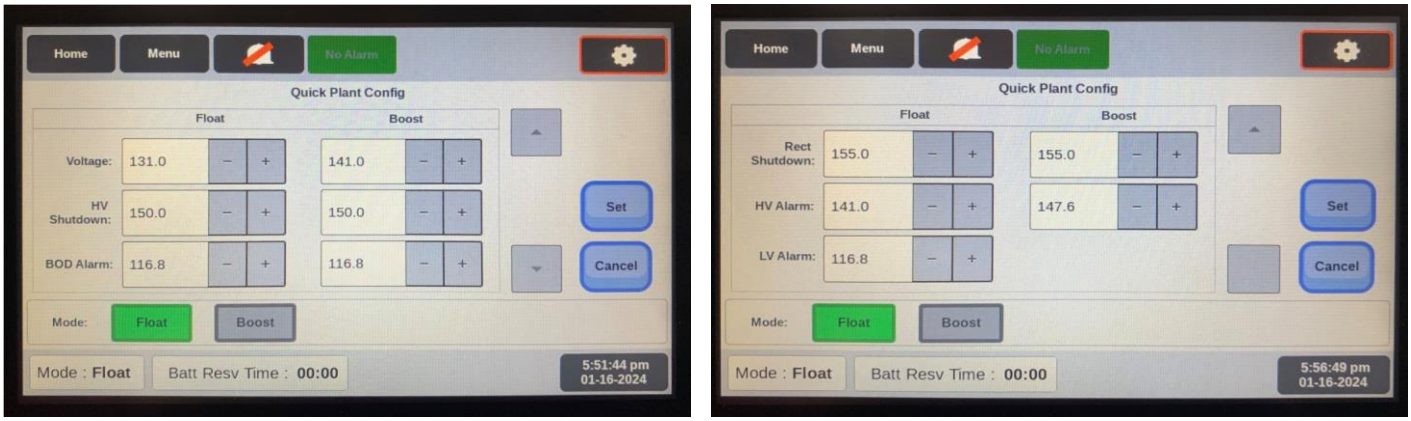


Figure 29 Plant Mode Screens

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Boost Mode

Table 8 Boost Configuration Continued

Set Point	Primary DC bus voltage set-point during the Boost mode of operation. Boost (set point) is adjustable from -48.00V to -58.00V and 22.00 to 30.00V in 0.1V increments. The factory default setting is -55.20V and 27.24V.
Set Point	Primary DC bus voltage set-point during the Boost mode of operation. Boost (set point) is adjustable from -48.00V to -58.00V and 22.00 to 30.00V and xxx.00V to yyy.000V in 0.1V increments. The factory default setting is -55.20V and 27.24V and 132.2V.
ISHVSD	This is an Independent High Voltage Shutdown threshold during the Boost mode of operation that is sent to and stored in the rectifiers that is used by each rectifier for independent high voltage monitoring. The threshold can be set from130V to 136V or -52.00V to -60.00V or +26.00 to +30.00V with a factory default setting of 132V, -58.50V and +29.25V for 125V, 48V and 24V systems, respectively.
Voltage Alarms	Has the ability to set similar DC bus level alarms during Boost as found with the Float mode of operation. This includes Very High Major, High Minor, and BD. **Very High Major** This is the High Voltage Shutdown Alarm (HVSD) threshold for the primary DC bus during Boost that when it is reached the controller will send out the HV shutdown command to the serial rectifiers so that the offending rectifier will shut itself down. The threshold can be set from -50.00V to -60.00V or +25.75 to +31.75V with a factory default setting of -57.00 and +28.24V for 48V and 24V systems, respectively. **High Minor** This alarm indicates an abnormally high output voltage on the secondary DC bus during Boost. The controller does not attempt to shut the offending unit down. The threshold can be set from -50.00V to -60.00V or +25.75 to +31.75V with a factory default setting of -56.00 and +27.74V for 48V and 24V for systems, respectively. **BD** Primary DC bus threshold setting used during the Boost mode of operation that determines when the system is determined to be operating either completely or partially on battery reserve. The threshold can be set from -46.00V to- 55.00V or +23.00 to +28.00V with a factory default setting of -51.00V and +25.54V for 48V and 24V systems, respectively.
Max Duration	Defines the maximum time duration the system can remain in the Boost mode of operation. Value set from 1 to 80 hours. The factory default setting is 5 hours.
Automatic	Enables or Disables the automatic boost feature. Boost may be configured to use a “Timed” or “Current” based algorithm. When set to Time, Boost will utilize a multiplication factor of the actual time of the last BD. When set to Current, Boost will end once the monitored battery current reaches the programmed threshold. These values can be modified through the remote interfaces.

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OmniOn Power Inc
601 Shiloh Rd
Plano, TX USA

omnionpower.com

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