HF-MAX™

Modular • Redundant • High Efficiency • Best-in-Class Features

HF-MAX™

Modular Switch Mode Battery Charger / Power Supply

HF-MAX™

Float Battery Charger and Power Supply

Modular, Redundant Platform

High Availability/Uptime Architecture

Industrial Construction

Natural Convection Cooled (No Fans)

Intelligent Power Modules (iPMs)

Hot Swappable

12, 24, 48, 130 Vdc iPMs

2, 4, 8-Slot Chassis

Low DC Output Ripple

High Efficiency and CEC Compliant

Universal AC Input

Wide DC Output Voltage Ranges

DC Voltage Switches

Battery Temperature Compensation

Sophisticated Alarming & Logging

Ethernet Communication Standard

Confirm Local Presence Button

Remote Voltage Sensing

AREMA Compliant

Made in the USA

- Industrial Switch mode (high frequency) technology
- 400W or 480W hot-swappable Intelligent Power Modules (iPMs)
  - 12Vdc, 400W, 20.0A (Max), 20.0A (Rated)
  - 24Vdc, 400W, 10.0A (Max), 10.0A (Rated)
  - 48Vdc, 480W, 10.0A (Max), 8.0A (Rated)
  - 130Vdc, 480W, 4.0A (Max), 3.3A (Rated)
- 2, 4, and 8-slot chassis options
- Multiple iPMs in a single chassis provide redundancy (N+1, N+2, etc) and will continue to operate if the User Interface Module (UIM) fails for high availability/ uptime applications
- UIM (system controller) is AC/DC powered for continued operation without AC
- Heavy-duty construction for industry-leading ruggedness and reliability
- Natural convection cooled (no fans)
- Conformal coated circuit boards for protection from moisture and other contamination
- High energy efficiency of > 93% at 240 Vac and > 91% at 120 Vac and full load
- California Energy Commission (CEC) battery charger system efficiency compliant
- Low DC output ripple
- Universal AC input: 100-240 Vac, 50-200 Hz
- Adjustable brackets for wall, shelf, floor, or EIA 19-in rack (front or rear) mounting
- Flexible battery types - Nickel-Cadmium (Ni-Cd), Flooded Lead-Acid (FLA), Valve Regulated Lead-Acid (VRLA)
- Battery temperature compensation with controlled limits
- Remote voltage sensing
- Alarms can be individually enabled/disabled, assigned a delay, assigned a priority, and assigned to the summary alarm relay
- Form C, dry contact summary alarm relay
- Logging of up to 10,000 history records, downloadable as a CSV file
- Ethernet communication standard for field or remote monitoring, access to logging data, and programming (local only using the Confirm Local Presence button for security)
- Confirm Local Presence button for extreme network security
- SNMP alarming and NTP date/time synchronization via Ethernet
- Real-time clock with battery backup
- Internal web server uses a modern, responsive framework
- Full AC input and DC output protection
- LED status indicators
- DC output voltage and current display option
- Meets or exceeds AREMA requirements

INTUITIVE USER INTERFACE & INTERNAL WEB SERVER

Alarm Relay Terminals
Form C, dry contacts. Configurable per alarm via the web server.

Battery Temperature Sensor Connector
Enabled/disabled, compensation value, min compensation limit, and max compensation limit configurable via the web server.
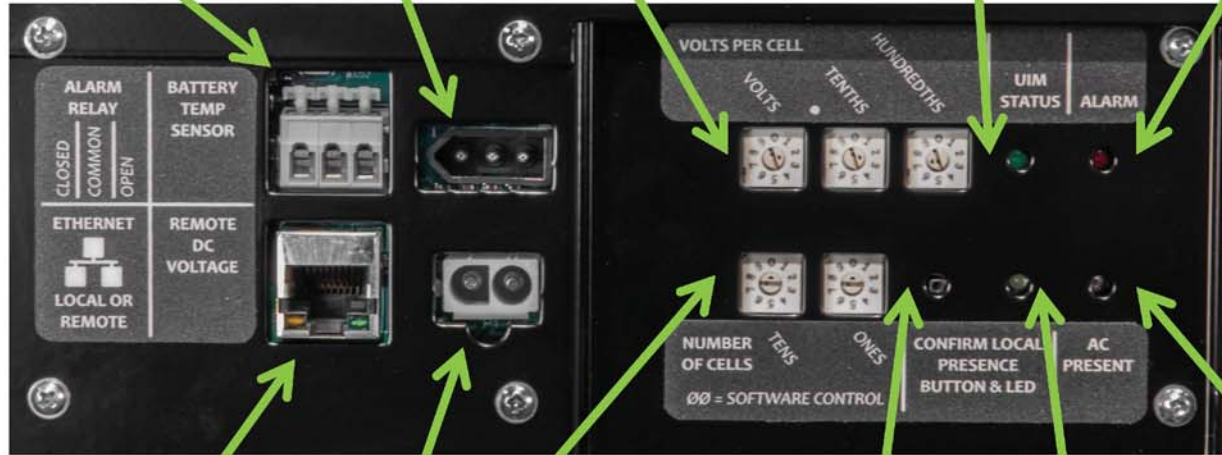
Volts Per Cell Rotary Switches
Used to manually set the float voltage per cell. Not used if the "Number of Cells" rotary switches are set to "OO", which enables float voltage control via the web server.

UIM Status LED
Green LED. Provides the status of the UIM.

Alarm LED
Red LED. Provides notification of system alarms and faults.

Ethernet Connector
Provides local or remote access to the internal charger web server via a standard Internet browser. The web server is used to check the status of the charger (DC amps, AC volts, etc), control the charger (on/off, manual equalize, etc), configure settings/alarms, and view/download the history log. NTP time synchronization and SNMP alarming are also supported.

Remote DC Voltage Connector
Enabled/disabled using the web server.

Number of Cells Rotary Switches
Used to manually set the number of battery cells. Setting to "OO" enables control via the web server.

Confirm Local Presence Button & LED
Pressing the button enables setting/alarm changes to be saved via the web server for a set amount of time. This ensures that the changes are being made locally and provides the highest level of possible security.

AC Present LED
Blue LED that is on when AC power is present.

The HF-MAX internal web server uses a modern, responsive frame-work for attractive display on smart phones and tablets, in addition to laptop and desktop computers.
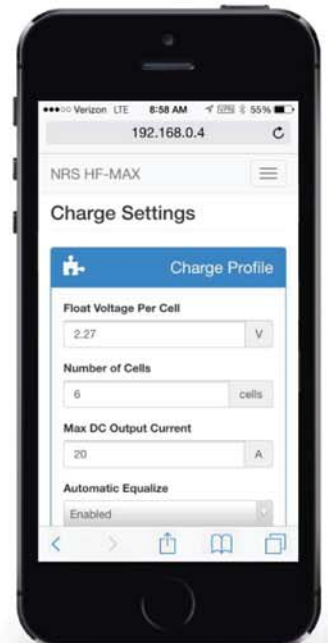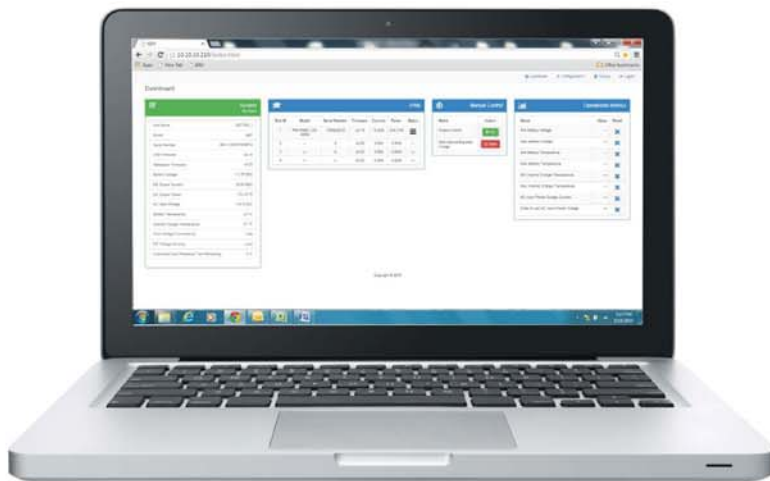
SPECIFICATIONS

AC Input

Voltage range, rated	100-240 Vac
Voltage range, operating	90-264 Vac
	< 100 Vac: reduced power
Frequency, rated	50-200 Hz
Frequency, operating	45-205 Hz
Phase	Single-phase
Current, maximum, per iPM	
400 W	5 A
480 W	6 A
Efficiency	> 91%, 120 Vac, full load;
	> 93%, 240 Vac, full load
Power factor	> 0.98, 120 Vac, full load;
	> 0.96, 240 Vac, full load
Protection	Current limit, surge, transient,

DC Output

Voltage range	
12 Vdc	1.00-20.00 Vdc
24 Vdc	10.00-40.00 Vdc
48 Vdc	30.00-61.00 Vdc
130 Vdc	100.00-150.00 Vdc
Power, maximum, per iPM	
12 Vdc, 24 Vdc	400 W
48 Vdc, 130 Vdc	480 W
Current, maximum, per iPM	
12 Vdc	20.0 A
24 Vdc	10.0 A
48 Vdc	10.0 A
130 Vdc	4.0 A
Current, rated, per iPM	
12 Vdc	20.0 A (at 20.00 Vdc)
24 Vdc	10.0 A (at 40.00 Vdc)
48 Vdc	8.0 A (at 59.00 Vdc)
130 Vdc	3.3 A (at 145.00 Vdc)
Current per iPM at other Vdc	
130 Vdc	3.9 A (at 122.58 Vdc);
	3.5 A (at 135.00 Vdc)
Protection	Current limit, short circuit, reverse
	polarity, surge, transient

Environmental

Operating temperature	
12 Vdc, 24 Vdc	-40 °C to 70 °C (-40 °F to 158 °F);
48 Vdc, 130 Vdc	-40 °C to 70 °C (-40 °F to 158 °F);
	> 50 °C: may reduce power
Storage temperature	-55 °C to 85 °C (-67 °F to 185 °F)
Operating humidity	0-95%, non-condensing
Storage humidity	0-95%, non-condensing

User Interface

Communication	Ethernet; 10/100BASE-TX; auto crossover, auto MDI-X; RJ45 connector; support for TCP/IP, NTP, and SNMP Traps; internal web server; ability to be used for networked comm or direct comm (direct connection to a laptop)
DC voltage switches	2 switches for Number of Cells; 3 switches for Volts per Cell
LEDs	
UIM	4 single-color; AC Present, Alarm UIM Status, Confirm Local Presence
iPM	1 tri-color; Charging, Equalizing, Fault/Limit
Display, DC output voltage and current	Optional: 4-slot chassis (standard); Standard: 4-slot and 8 slot chassis (with breakers)
Button	Confirm Local Presence
Battery temp comp	Yes (sensor optional)
Remote voltage sensing	Yes (wiring optional)
Alarming	
Alarms	Individually enabled/disabled, assigned a delay, assigned a priority, assigned to the summary alarm relay
Summary alarm relay	Form C, dry contact
Ethernet alarming	SNMP Traps
Logging	Up to 10,000 events (alarms, faults, AC on/off)

Mechanical

Cooling	Natural convection (no fans)
Protection	Conformal coated circuit boards
AC/DC terminals	AAR or screw terminal block
Dimensions (WxHxD)	Including standard brackets
4-slot chassis (standard)	18.94 x 10.32 x 11.82 inches
2-slot chassis (standard)	10.25 x 10.32 x 11.82 inches
8-slot chassis (with breakers)	18.94 x 30.50 x 14.31 inches
4-slot chassis (with breakers)	18.94 x 17.71 x 12.79 inches
Weight (approx, empty)	
4-slot chassis (standard)	22 lbs
2-slot chassis (standard)	13 lbs
8-slot chassis (with breakers)	63 lbs
4-slot chassis (with breakers)	39 lbs
Single iPM	6 lbs
Mounting	Shelf, wall, floor, EIA 19-inch rack (optional for 2-slot, standard for all others), EIA 23-inch rack (optional)

Reliability & Certifications

MTBF	Telcordia SR-332, MIL-STD-267, 40 °C ambient
UIM	964,000 hours
iPM	738,700 hours at full output

AREMA; FCC Part 15, Class A; CEC Appliance Efficiency Regulations, Title 20 (pending for 48 Vdc); EN emissions, immunity, safety (pending); CE certified (pending); designed to UL 1012, 1236