# **Classic Charge Controller**



#### **MPPT Controllers**



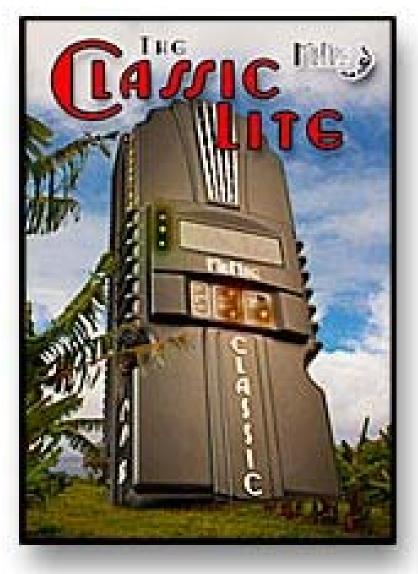
# The MidNite Classic

# Six years in the making

The world's most sophisticated MPPT controller



The Classic Lite. 96 amps for the price of 60!





# The MidNite Classic

- Incorporates things we have learned by producing tons of controllers
- MPPT for wind turbines, Solar and Hydro
- Worlds only arc fault detecting controller
- Built in DC-GFP saves money
- HyperVOC mode extends cold temperature VOC capability
- Ethernet, USB and RS232 interface standard
- Two aux outputs/inputs
- High voltage versions available 150, 200 and 250VDC
- Wizard driven set up insures compatible module mix
- User upgradeable firmware
- Graphical display vs. alpha numeric
- Stores 380 days of data
- Graphs of data available on the display and PC and internet
- Time, date and location settings
- Voice is being added to the display Summer 2012
- Ethernet output allows easy Wi-Fi hook up
- Display is re-locatable up to 1000 feet

## Classic vs. Lite comparison

	Standard Classic			Classic Lite					
Model	150	200	250	250KS	150	200	250	250KS	
Rated Amps	80-96	65-74	55-60	35-56	80-96	65-74	55-60	35-56	
Max Operating Voltage	150	200	250	250	150	200	250	250	
Max VOC1	198	248	298	298	198	248	298	298	
Max Battery Voltage	72	72	72	120	72	72	72	120	
Solar	٠	۲	٠	•	•	٠	٠	۲	
Wind	•		٠	•	•	۲	•	•	NOTE <sup>4</sup>
Hydro	•	٠	•	•	•	•	•	•	
List Price	\$850	\$850	\$950	\$950	\$700	\$700	\$800	\$800	
Cost Per Watt - 48 Nominal Battery V	\$0.19	\$0.22	\$0.30		\$0.16	\$0.18	\$0.25		
Cost Per Watt - 120 Nominal Battery V				\$0.19				\$0.16	
Digital Display	•	•	•	•					
Internet and Ethernet Ready <sup>2</sup>	•	•	•	•	•	•	•	•	
Ground Fault Detector	•	۲	•	•	•	•	•	٠	
Arc Fault Detector	•	•	•	•					
Graphical Display	•	۲	•	•					
Free User Upgradable Firmware	٠	۲	٠	•	٠	٠	۲	٠	
MNGP Multiple Display Support <sup>3</sup>	•	•	•	•	•	•	•	۲	
Aux Output	2	2	2	2	2	2	2	2	
Five Year Warranty	•	•	•	•	•	•	•	•	
Oscilloscope Display	•	•	•	•					
DIP Switches For Programming					•	•	•	۲	
Substantially Made In USA	•	•	٠	•	٠	٠	۲	٠	
Partial Shading Indicator <sup>2</sup>	•	•	•	•	•	0	•		NOTE <sup>2</sup>
Bonus Amps Based On Voltage	٠	•	•	•	•	٠	٠	۲	
ModBus Communications	•	٠	•	•	•	•	•	٠	
HyperVOC Extended VOC Limit	•	•	•	•	•	•	•	٠	
Free PC & Internet Software	•	•	•	•	•	•	•	٠	
380 Days Data Logging <sup>2</sup>	•	•	•	•	•	•	•	٠	
8 Built In Data Logging Params	٠	٠	•	•					
11 Software Data Logging Params <sup>2</sup>	•	•	•	•	•	•	•		
Graphing Capabilities <sup>2</sup>			•	•	•				

plus nominal battery voltage (NBV) up to 48v. The difference between MOV and NBV + MOV is the HyperVOC Extended VOC range.

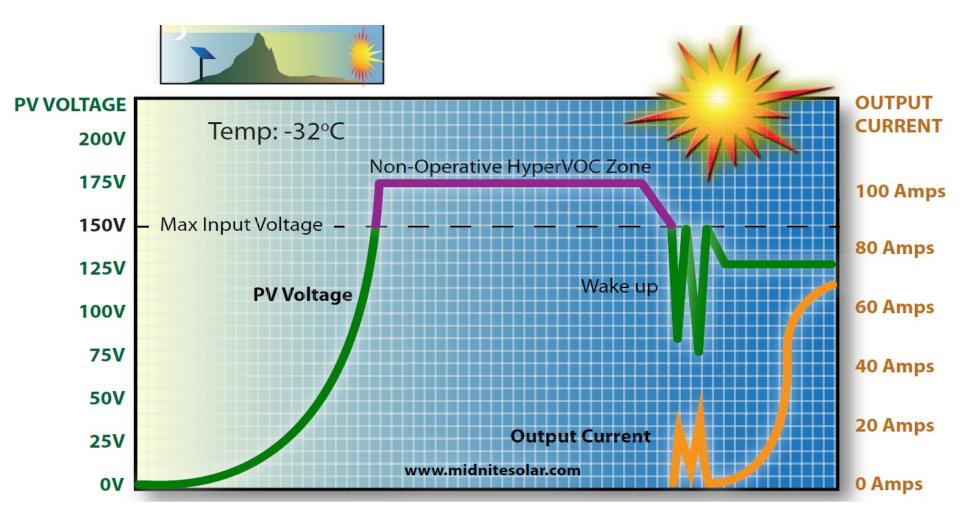
The MNGP display can be removed from the Classic and used remotely. 4 Available Sept. 2012 for the Lite with provided software.

2 With PC and provided software.

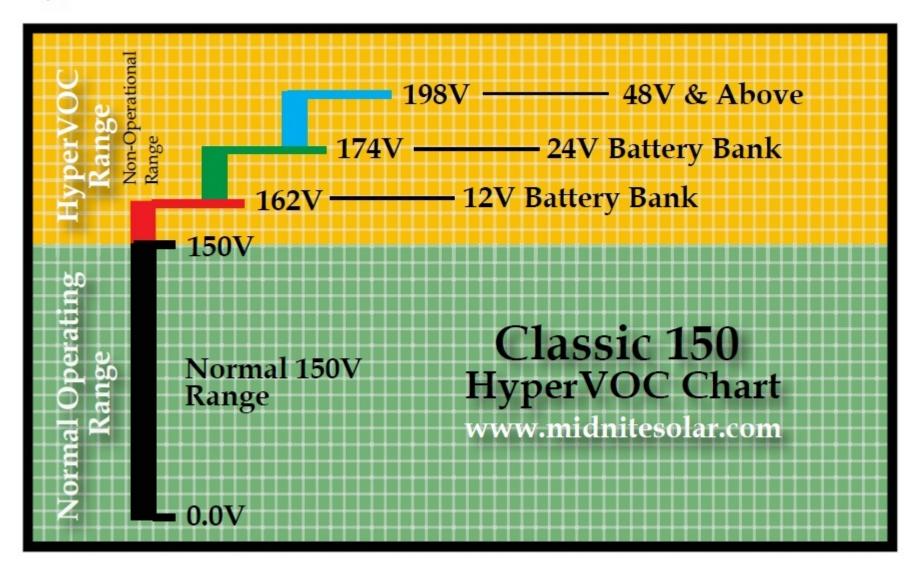
# Date gathered by APRS World

	MidNite Classic 150	Outback FM-60	Xantrex XW 60 MPPT
Day 1	2,163 Wh	1,956 Wh	2,084 Wh
Day 2	3,852 Wh	3,534 Wh	3,446 Wh
Day 3	3,924 Wh	3,728 Wh	3,380 Wh
Day 4	5,025 Wh	4,665 Wh	4,617 Wh
Day 5	817 Wh	658 Wh	791 Wh
Day 6	818 Wh	664 Wh	786 Wh
Day 7	4,598 Wh	4,090 Wh	3,276 Wh

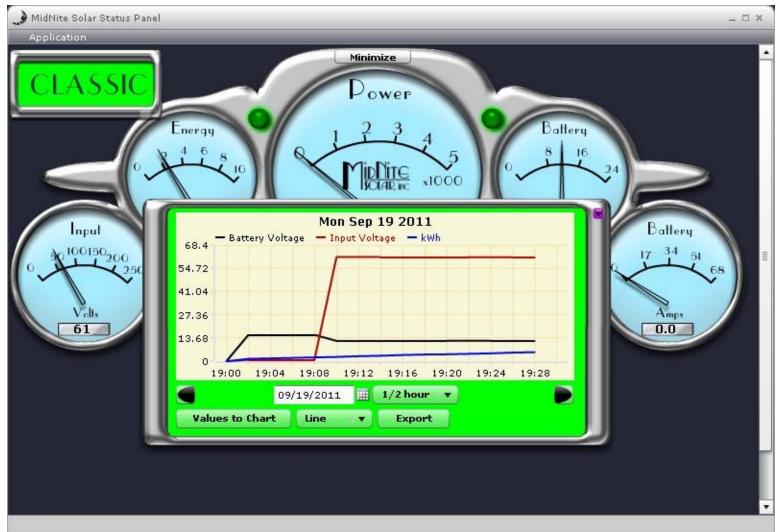




#### HyperVOC Charts for the Classics 150



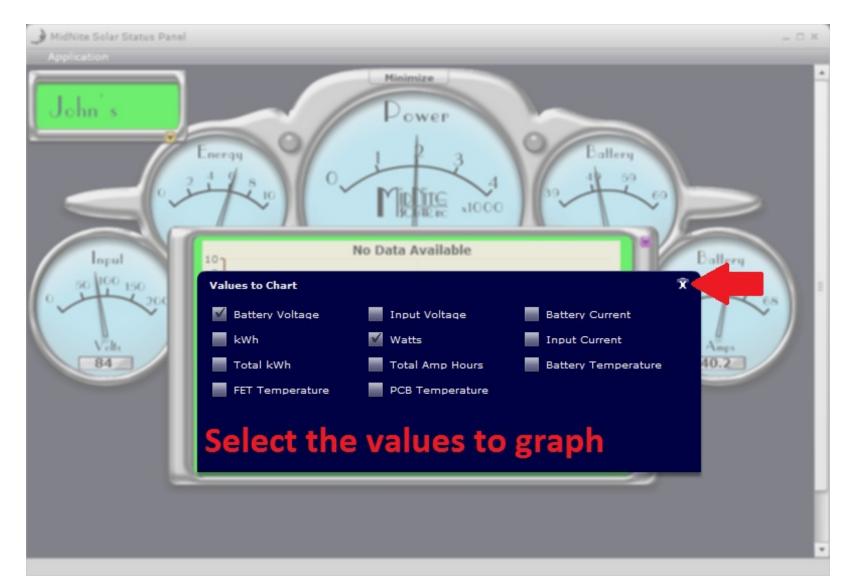
# Graphs and data are displayed on your PC using the "local app" or over the internet on "www.mymidenite.com"



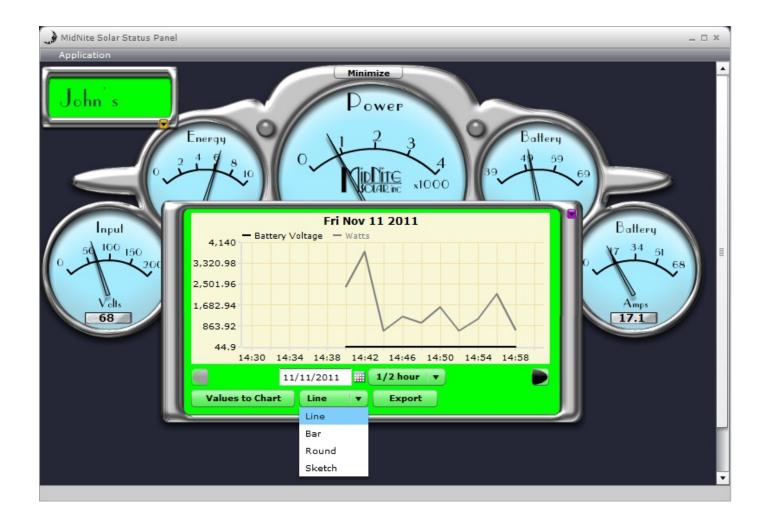
#### Bar graph screen



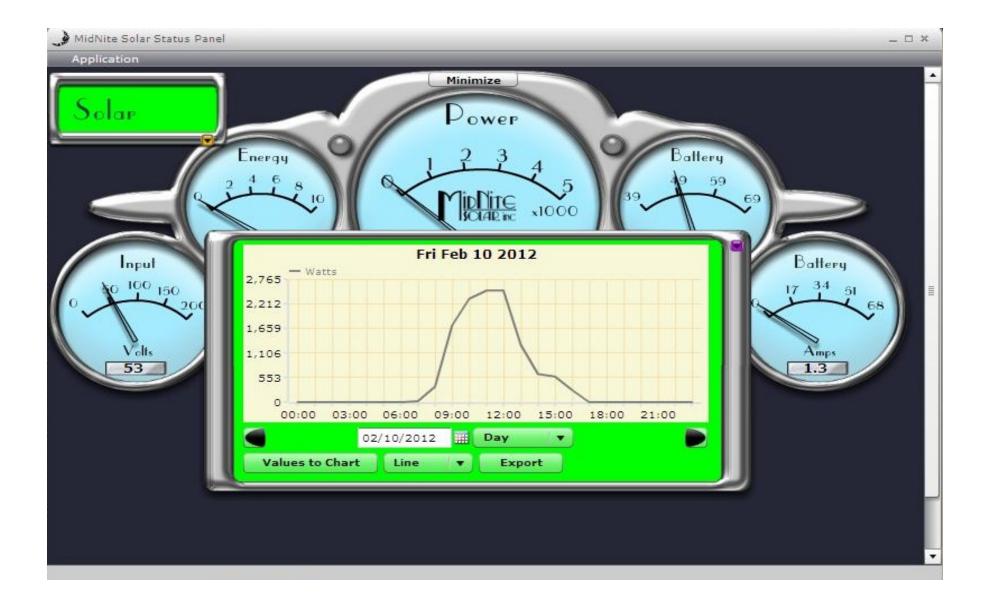
#### Data that we can Graph with the App



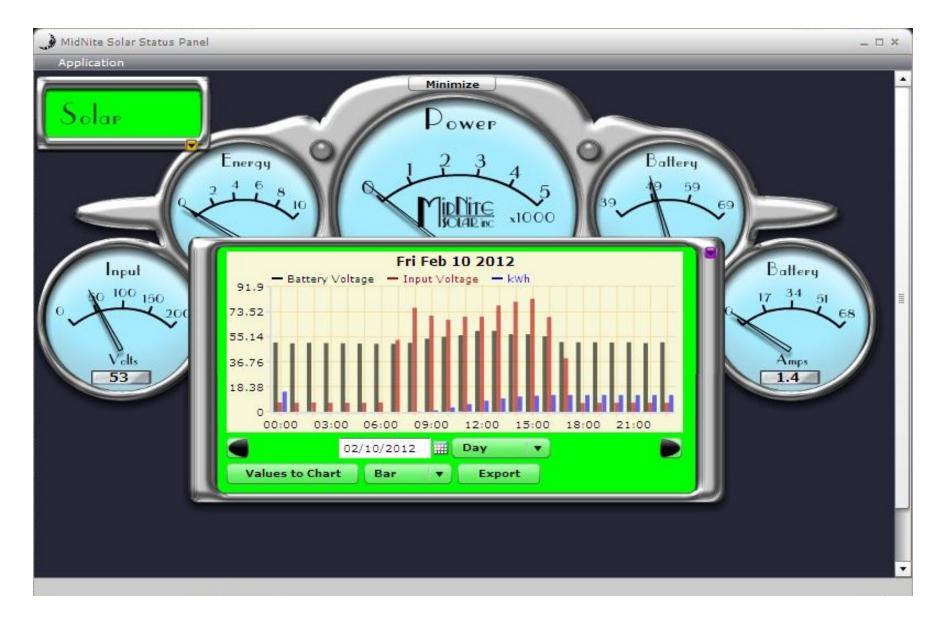
## Selecting the style of Graph



### Wattage for a 24hr period



#### More Graphing options.



# 2 way communications as well.

#### MidNite Solar Status Panel \_ 🗆 X Minimize W ind Power Battery .75 nergy 59 MIDNITE X1000 60 2 Classic Name: Wind Battery Input Ð 100 200 TCP Port: 518 34 AUX 1: Slow battery diversion control Ð Off Diversion Amps Volts AUX 2: PWM CONTROL FOR CLIPPER 0 38 0.0 Ð **Clipper Control** Auto •

# Data Logging and Graphing

The Classic logs **380 days** of data in its Daily logs.

The Classic logs data every 5 minutes in its Recent logs allowing you to view the last 24 hours.

The Classic also has graphing of this logged data available on screen as well.

New string sizing tool helps design the array. The sizing tool also helps determine the best Classic model number to use

Power:     220     Watts       VOC (Open Circuit Voltage):     37.6     Volts       VVP (Maximum Power Point Voltage):     30.6     Volts       SISC: (Short Circuit Amperage)     8.22     Amps     MidNite Solar Inc.       MP (Maximum Power Point Amperage):     7.87     Amps     17722 - 67th Ave NE,       VOC Temp Coef %:     0.43     C°     Arlington, WA 98223       VMP Temp Coef %:     0.45     C°     Fax 360-691-6862       Coldest Ambient Temperature:     40     C°       Nominal Battery Volts:     48     Volts       PV Array     Number Of Modules In Series:     5       Number Of Modules In Series:     5       Number Of Modules In Series:     5       Number Of Parallel Strings:     4       Anticipated Array Power:     4400       Mudes     20       Rated PV Array Oursent:     31.48       Moray Corrent:     31.48       Moray Corrent:     31.48       Mud Quasimum Power Point Voltage):     153       VOC (Open Circuit Voltage):     163       VOR (Maximum Power Point Voltage):     163       VOC (Open Circuit Voltage):     188       VOR (Maximum Power Point Voltage):     163       VOC (Open Circuit Voltage)     188       VOR (Maximum Power Point V	PV Module Data	CLASSIC	SIZIN	G TOOL		
VOC (Open Circuit Voltage):       37.6       Volts         VMP (Maximum Power Point Voltage):       30.6       Volts         SC: (Shot Circuit Amperage)       8.22       Amps       17722 - 67th Ave NE, Arlington, WA 98223         VMP Temp Coef %:       0.33       C°       Arlington, WA 98223         VVM Temp Coef %:       0.45       C°       Ph. 360-403-7207         Environmental Data       Fax 360-691-8662       www.midnite solar.com         VMMber Of Modules In Series:       4       Volts         VNmber Of Modules In Series:       5       www.midnite solar.com         Number Of Modules In Series:       5       www.midnite solar.com         Anticipated Array Power:       4400       Vatts         Anticipated Array Power:       4400       Vatts         Anticipated Array Current:       31.48       Amps         Battery Charigin Current @ 57.6 V:       76.4       Amps         VMP (Maximum Power Point Voltage):       153       Volts       VMP @ 30.C°;         VMP @ 30.C°;       191       Volts       Volts       Classic250/Lite		220	Watts			
Name       Solver       30.6       Volts         WMP (Maximum Power Point Voltage):       30.6       Volts       MidNite Solar Inc.         SC: (Shot Circuit Amperage)       8.22       Amps       177722 - 67th Ave NE,         MP (Maximum Power Point Amperage):       7.87       Amps       177722 - 67th Ave NE,         VMP Temp Coef %:       0.45       C°       Ph. 360-403-7207         Fax 380-691-6862       Www.midnitesolar.com       Fax 380-691-6862         Coldest Ambient Temperature:       -30       C°       Www.midnitesolar.com         Hottest Ambient Temperature:       40       C°       Www.midnitesolar.com         Nominal Battery Volts:       48       Volts       Volts         Varay       Pwer:       4400       Watts       Arrington, WA 98223         Number Of Modules In Series:       5       Number Of Parallel Strings:       4         Total Modules       20       Rated PV Array Current:       31.48       Amps         Battery Voltage       153       Volts       VOC (Open Circuit Voltage):       153       Volts         VOC (Open Circuit Voltage):       188       Volts       VOR       250       250         Max Anoperating Voltage       150       200       250       250 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						
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WOC @ -30 C°:       222       Volts         Charge Controller Selection       Classic150/Lite       Classic200/Lite       Classic250/Lite       Classic250/KS         Max Operating Voltage       150       200       250       250         Max Non operating VOC (HyperVOC) @       198       248       298       298         Max Non operating VOC (HyperVOC) @       198       248       298       298         Max Non operating VOC (HyperVOC) @       198       248       298       298         Max Non operating VOC (HyperVOC) @       198       248       298       298         Maximun Number Of Modules In Series       3       4       5       5         Max Allowable Output Current Per Classic       76       65       55       50         Based On This Current Configuration       Max Allowable Wattage Per Classic       4438       3796       3212       2900         Based On This Current Configuration       4400       4400       4400       4400       4400         Present PV Array Wattage Of This       4400       4400       4400       4400       4400       4400         Design Check       TOO HIGH       MARGINAL (HyperVOC)       OK       OK       OK       OK       C°						
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Max Allowable Output Current Per       76       65       55       50         Classic       Based On This Current Configuration       4438       3796       3212       2900         Max Allowable Wattage Per Classic       4438       3796       3212       2900         Based On This Current Configuration       4400       4400       4400       4400         Present PV Array Wattage Of This       4400       4400       4400       4400         Configuration       Design Check       Max VOC       TOO HIGH       MARGINAL (HyperVOC))       OK       OK       OK         Temperature The Classic Will       N/A       6 C°       -75 C°       -75 C°       -75 C°         Enter HyperVOC       OK       EXCESSIVE       EXCESSIVE       EXCESSIVE       EXCESSIVE	Max Number Of Modules In Series (Using	4		5	6	6
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ind, i ener (i tallage)	Temperature The Classic Will Enter HyperVOC	N/A		6 C°	-75 C°	
	Array Power (Wattage)	OK		EXCESSIVE	EXCESSIVE	EXCESSIVE
	Classics Required	1		1.2	1.4	1.6

NOTE: MidNite Solar recommends a second controller be added after 1.2

WARNING: MidNite Solar makes no representation, warranty or assumption of liability regarding the use of the String Calculator. This tool uses data provided by other parties (such as PV module specs) and makes calculations based on assumptions which may or may not prove to be valid.

# The MidNite Solar Forum

nidnitesolar.com		simplemachines forum
Hello Halfcrazy Show unread posts since last visit. Show new replies to your posts. February 11, 2012, 12:17:55 PM	Ou	Sea Ne ur new Surge protection Device is now ETL listed in all 3 mo
ome Help Search Admin Moderate Profile My Messages Members Logout		
General Category	6 Dente	Unread Posts
General FAQ'S Moderator: Halfcrazy	6 Posts 3 Topics	in Re: Battery manufacturer on December 19, 2011, 06:20:13 PM
MidNite Solar "Power Time" A series of videos documenting MidNite Solar's product line Moderators: Halfcrazy, Rob	3 Posts 2 Topics	Last post by Halfcrazy in MOVED: Distributors/ res on February 02, 2012, 08:21:23 AM
General Discussion Moderator: Halfcrazy	326 Posts 32 Topics	Last post by boB in Re: Ice melting feature on February 02, 2012, 09:30:26 AM
System Design and Layout Moderator: Halfcrazy	93 Posts 13 Topics	Last post by Vic in Re: Request for efficien on January 02, 2012, 10:36:06 AM
harge Controllers and Clippers		Unread Posts
Charge controller and Clipper FAQ'S Moderator: Halfcrazy	42 Posts 20 Topics	Last post by Robin in Re: What is Hyper VOC??? on December 16, 2011, 11:01:18 PM
Classic charge controller Moderator: Halfcrazy	1496 Posts 175 Topics	Last post by Halfcrazy in Re: Feature or bug? on Today at 09:39:40 AM

 Clipper's
 101 Posts

 Moderator: Halfcrazy
 7 Topics

MidNite Solar Monitoring	; software		

Unread Posts

I was work by undered

Last post by Halfcrazy

in Re: Status of Clipper

on November 09, 2011, 05:45:10 AM

## Breaker sizing can be confusing

- PV input needs to be 1.25% larger than SOC
- Output sized for max output current (no derating)
- Breakers are there to protect wiring, not electronics
- The Midnite website has a page on breaker sizing that takes into consideration all variables
- The Wizard can help select proper breaker sizing too
- Call our tech support and talk to Tom or Ryan

#### 228 VDC is the MPPT here



#### SolarFest 2011 - Vermont



#### Eight Classics by the Solar Stone



#### Cabot Lodge, Canada



## Parallel operation

- Parallel is in development now.
   Communications is via telephone cable
- No Hub required
- Available in about one week
- All MidNite controllers in the field can be upgraded to allow parallel operation by downloading new firmware

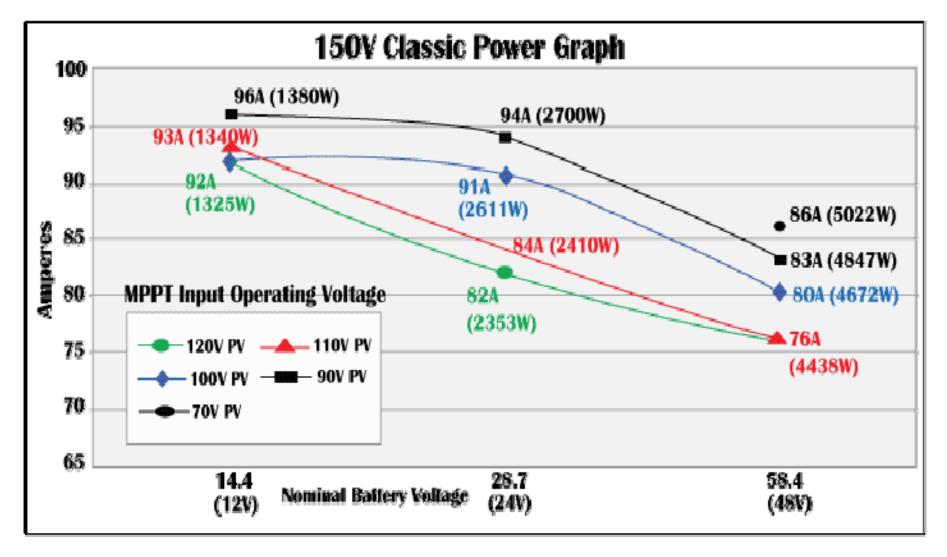
#### An installation in OZ



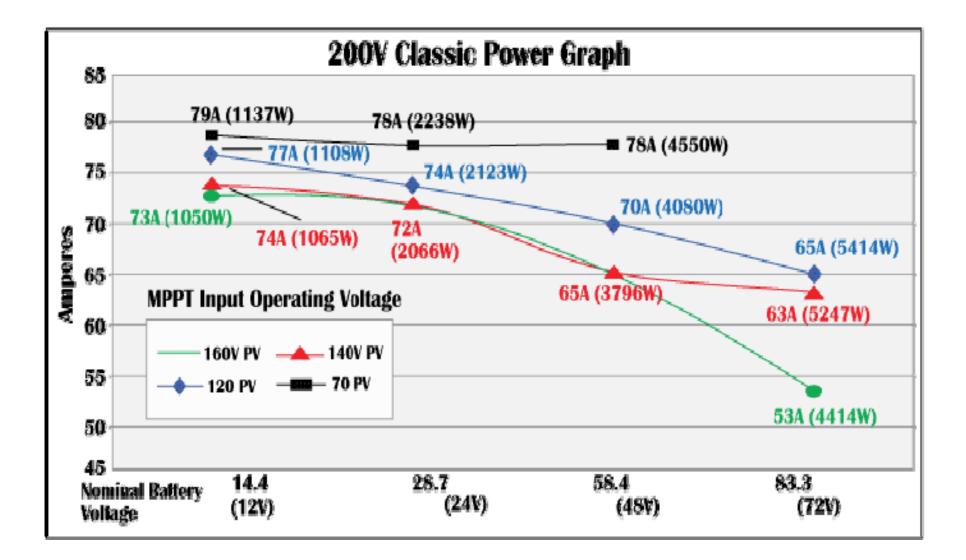
An Island off the East Coast (30 Classics)



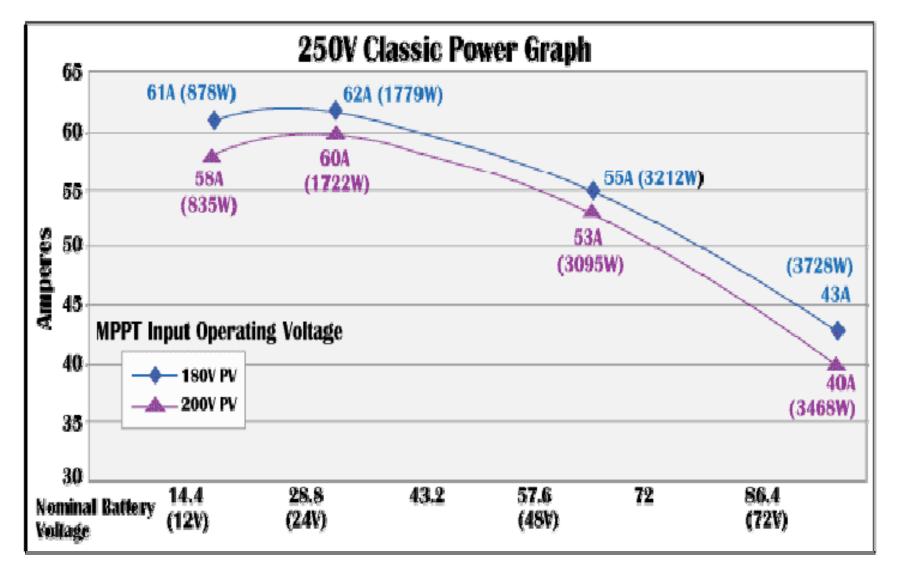
### Classic 150 power graph



### Classic 200 power graph

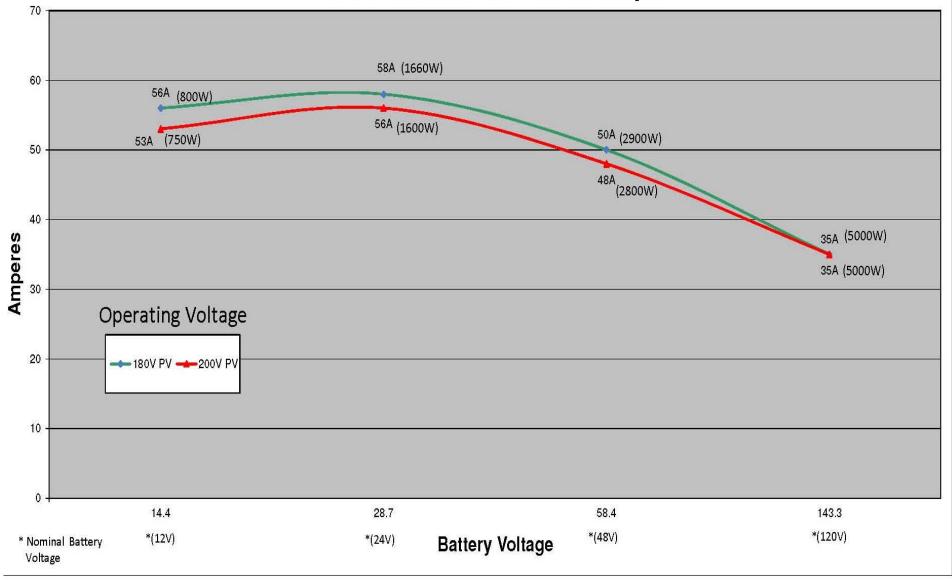


### Classic 250 power graph

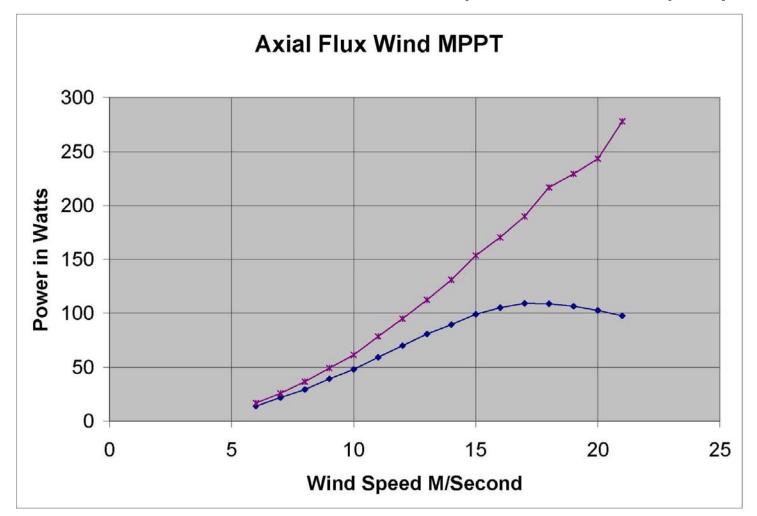


#### Classic 250KS

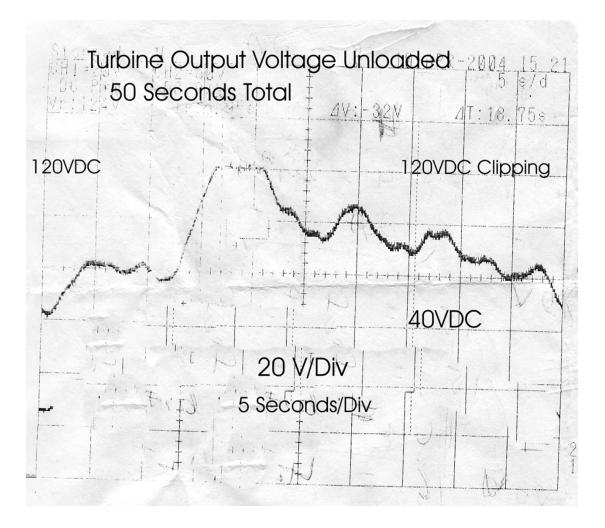
#### **250VKS Classic Power Graph**



Top line = MPPT on wind turbine Bottom line = battery connected turbine This graph is made from actual data – lots more power The Classic for wind can double or triple turbine output power



This scope photo shows the wind turbine output being clipped at 120VDC.



# The MidNite Clipper



# Clippers

- What is a Clipper?
- A Clipper is a voltage limiter that connects up a dump load across a wind turbine or a hydro system. It does not connect the dump load across the battery as all other dump loads presently do.
- The dump load is controlled by a PWM signal to maintain a controlled load on the turbine.

# Clippers

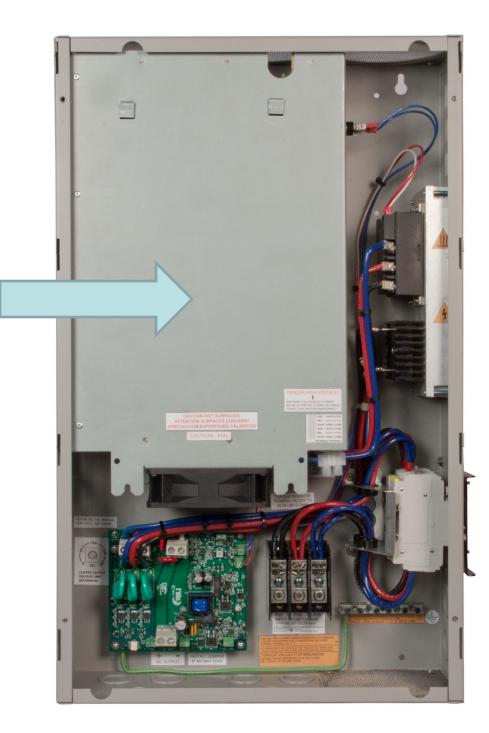
- Why do you need a Clipper?
- When the Classic is done charging the batteries, it will cease to put current into the battery. This effectively is like cutting the input to the Classic.
- When the turbine can no longer put power into the batteries, it would free wheel.
- Turbines do not like to free wheel.
- They spin very fast, make noise and throw blades. None of these are good things.

# Clippers

 When the Classic is done charging batteries, it sends a signal to the Clipper to hold the batteries at a certain voltage for a while. Then it loads the turbine down further to float the batteries. It does this by lowering the output voltage of the turbine. This saves wear and tear on the turbine because it is turning slower. It also makes much less noise.

# The MidNite Clipper

Dump load can be replaced in the field if required to match the turbine



Look for Rosie to come alive in an upcoming Classic video



In **Development:** Classic/Clipper in a rainproof casting for the US Army. This utilizes a completely solid state Clipper. A consumer version will also be available



Midnite Solar has begun producing instructional videos on our products. We use MidNite employees for these videos, They are not solar professionals so sometimes the results are quite humorous.



We now have over a dozen short videos on the Classic alone. These videos walk you through the different features and menus of the classic. After viewing our videos, you will feel comfortable using the Classic.



# Disconnecting combiners now shipping 4 to 16 strings



#### MNPV6 Disco combiner Micro Combines three strings of Enphase inverters



### The MidNite kitty

