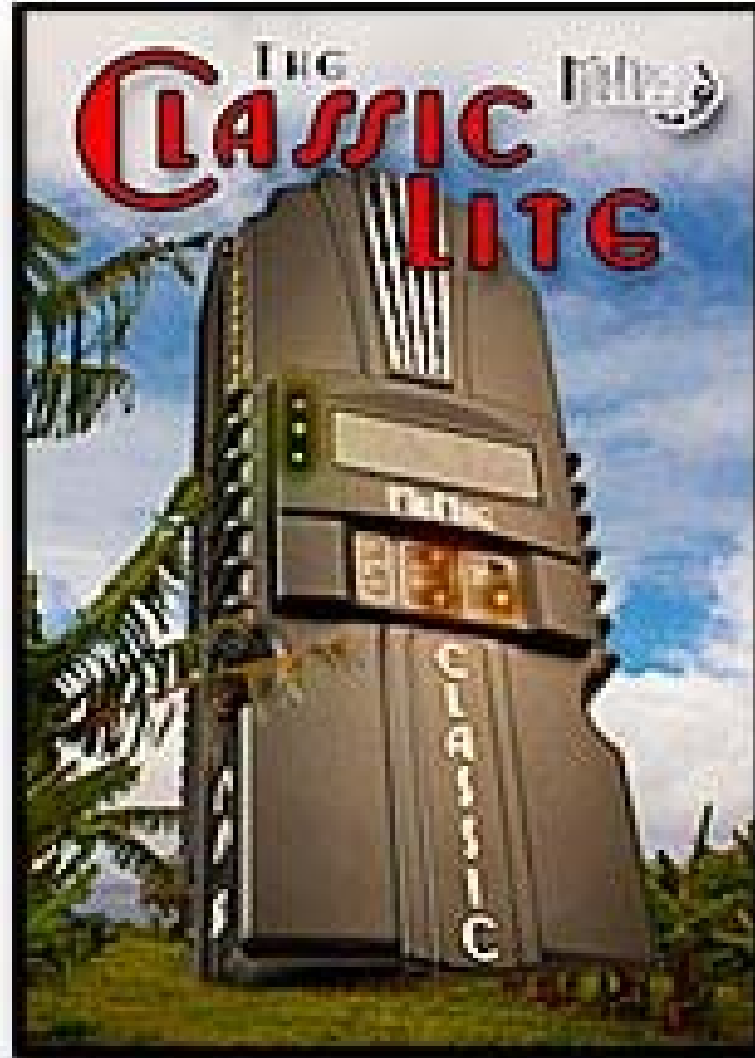# Classic Charge Controller

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

MIDNITE SOLAR'S STANDARD CLASSIC AND CLASSIC LITE COMPARISON CHART - July 19, 2012										
	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 VOC[1]	198	248	298	298		198	248	298	298	
Max Battery Voltage	72	72	72	120		72	72	72	120	
Solar	●	●	●	●		●	●	●	●	
Wind	●	●	●	●		●	●	●	●	NOTE [4]
Hydro	●	●	●	●		●	●	●	●	
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 [2]	●	●	●	●		●	●	●	●	
Ground Fault Detector	●	●	●	●		●	●	●	●	
Arc Fault Detector	●	●	●	●						
Graphical Display	●	●	●	●						
Free User Upgradable Firmware	●	●	●	●		●	●	●	●	
MNGP Multiple Display Support [3]	●	●	●	●		●	●	●	●	
Aux Output	2	2	2	2		2	2	2	2	
Five Year Warranty	●	●	●	●		●	●	●	●	
Oscilloscope Display	●	●	●	●						
DIP Switches For Programming						●	●	●	●	
Substantially Made In USA	●	●	●	●		●	●	●	●	
Partial Shading Indicator [2]	●	●	●	●		●	●	●	●	NOTE [2]
Bonus Amps Based On Voltage	●	●	●	●		●	●	●	●	
ModBus Communications	●	●	●	●		●	●	●	●	
HyperVOC Extended VOC Limit	●	●	●	●		●	●	●	●	
Free PC & Internet Software	●	●	●	●		●	●	●	●	
380 Days Data Logging [2]	●	●	●	●		●	●	●	●	
8 Built In Data Logging Params	●	●	●	●						
11 Software Data Logging Params [2]	●	●	●	●		●	●	●	●	
Graphing Capabilities [2]	●	●	●	●		●	●	●	●	

[1] This number is based on the max operating voltage (MOV) of the unit plus nominal battery voltage (NBV) up to 48v. The difference between MOV and NBV + MOV is the HyperVOC Extended VOC range.

[2] With PC and provided software.

[3] The Classic MNGP display and/or a secondary display can monitor many controllers. The MNGP display can be removed from the Classic and used remotely.
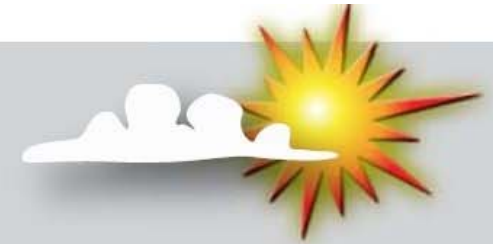
[4] Available Sept. 2012 for the Lite with provided software.
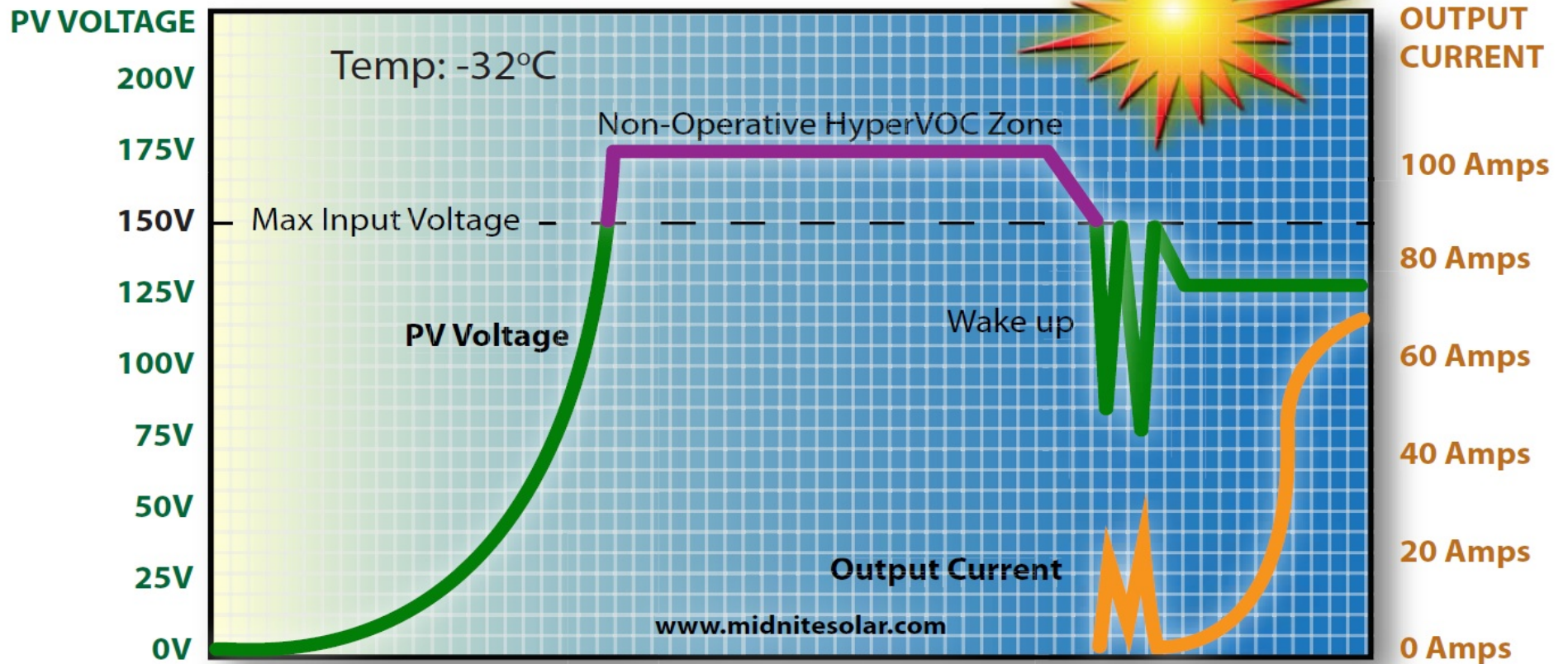
Date gathered by APRS World

	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
-32°C

MidNite Solar Inc
www.midnitesolar.com

Temp: -32°C

PV VOLTAGE		OUTPUT CURRENT
200V		
175V	Non-Operative HyperVOC Zone	100 Amps
150V	Max Input Voltage	
125V		80 Amps
100V	Wake up	60 Amps
75V	PV Voltage	40 Amps
50V	Output Current	20 Amps
25V		
0V	www.midnitesolar.com	0 Amps

HyperVOC Charts for the Classics 150

HyperVOC Range
Non-Operational Range

198V ———————— 48V & Above

174V ———————— 24V Battery Bank

162V ———————— 12V Battery Bank

150V

Normal Operating Range

Normal 150V Range

0.0V

Classic 150
HyperVOC Chart

www.midnitesolar.com
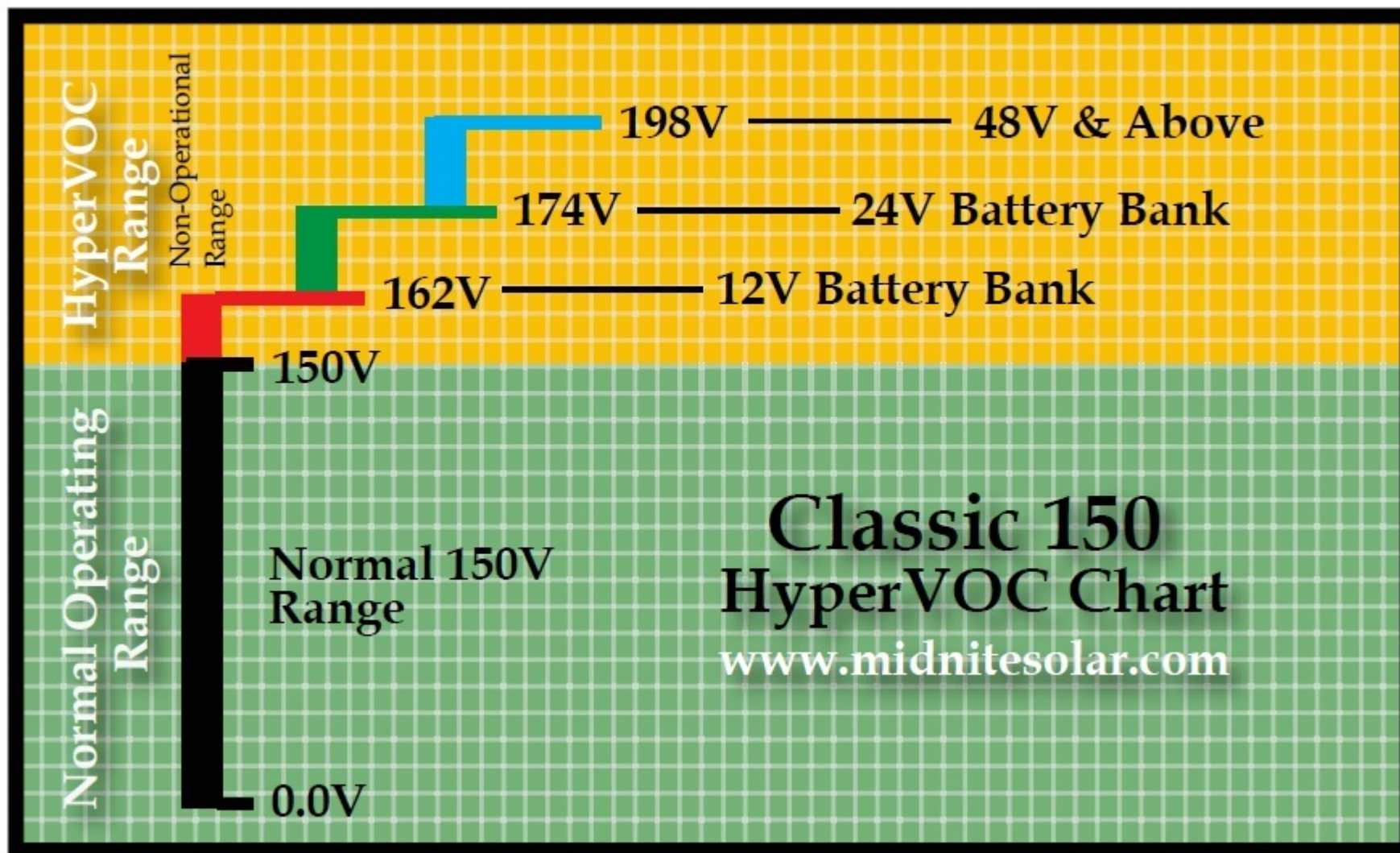
Graphs and data are displayed on your PC using the "local app" or over the internet on "www.mymidenite.com"
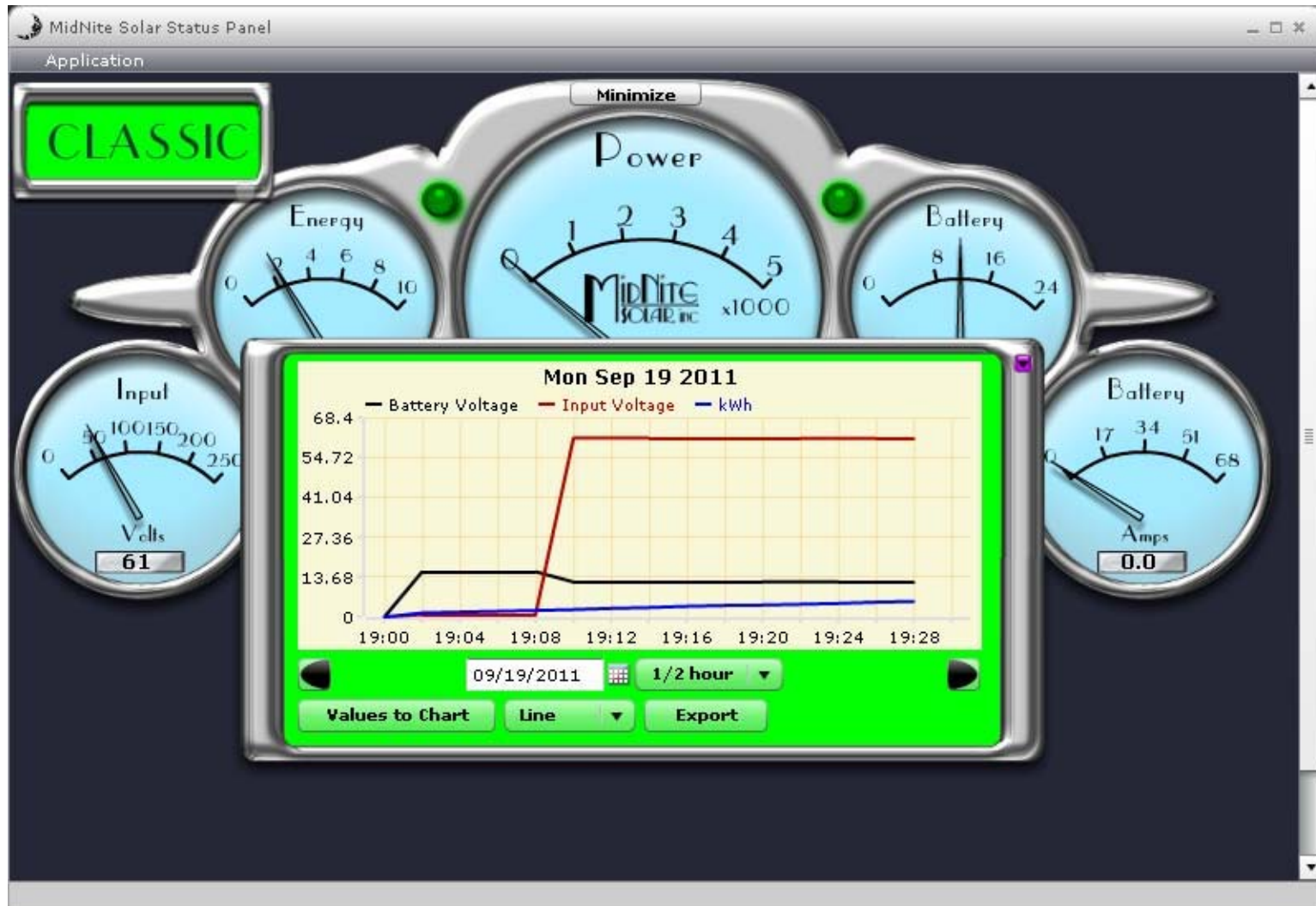
Bar graph screen
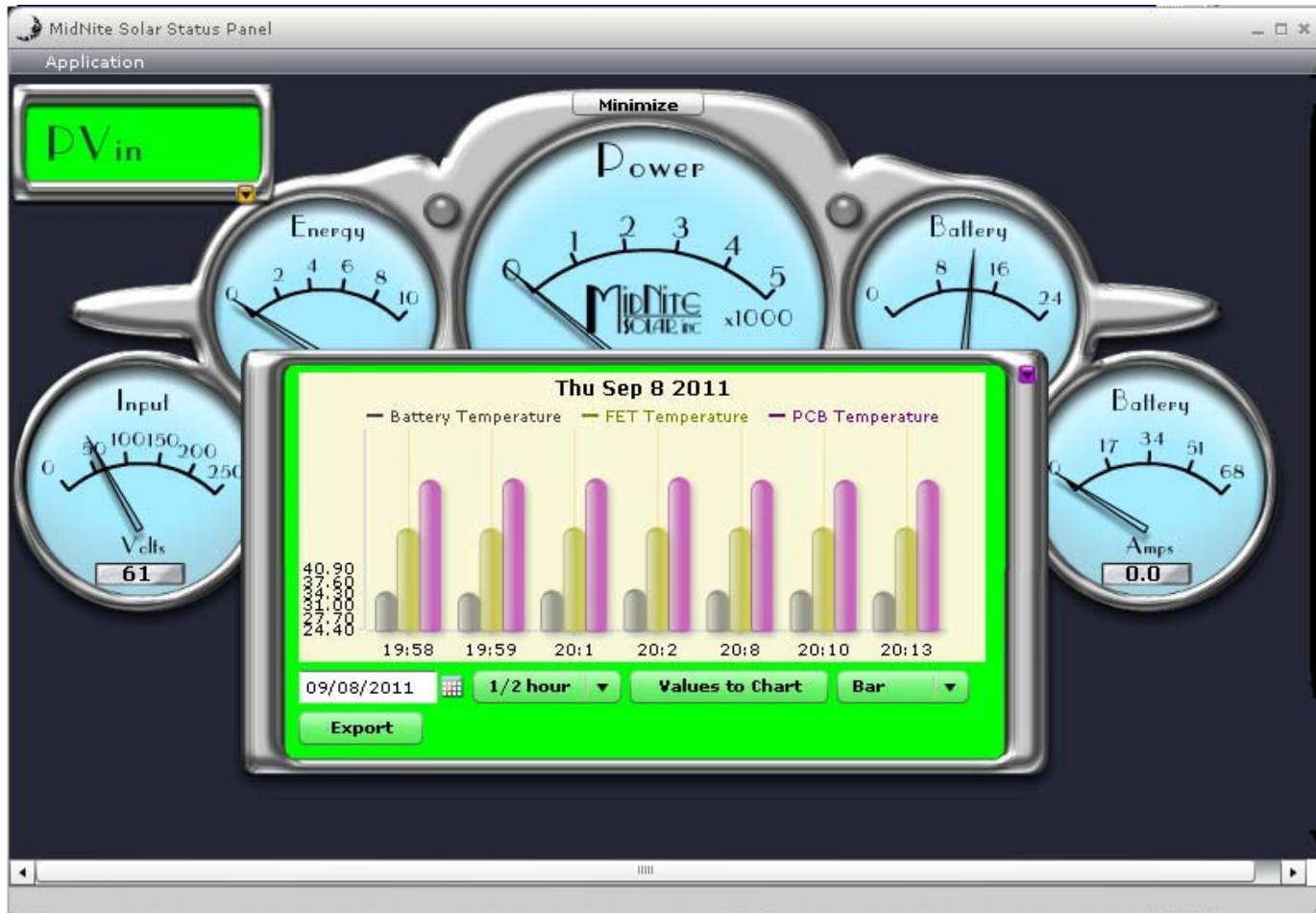
Data that we can Graph with the App
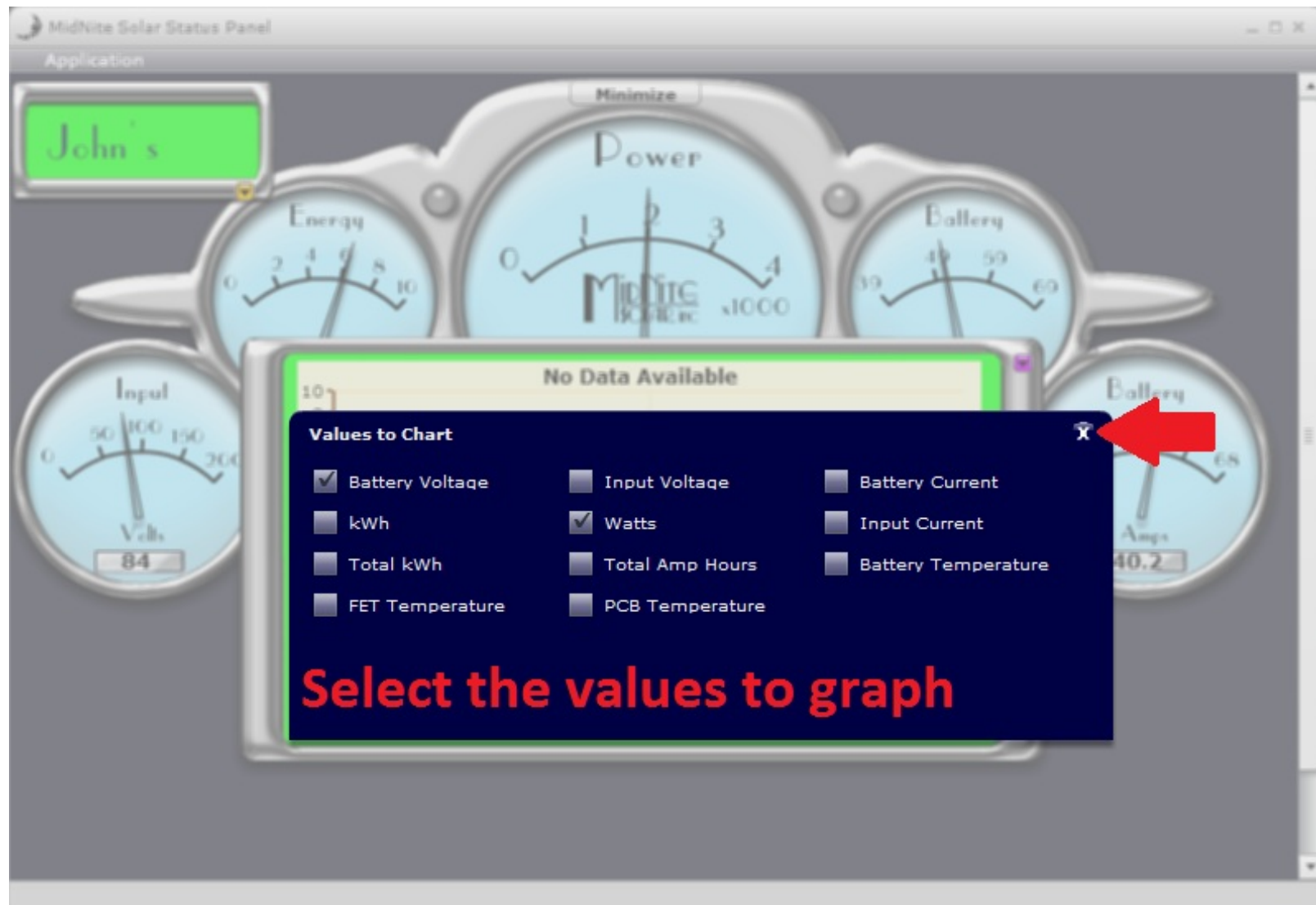
Selecting the style of Graph
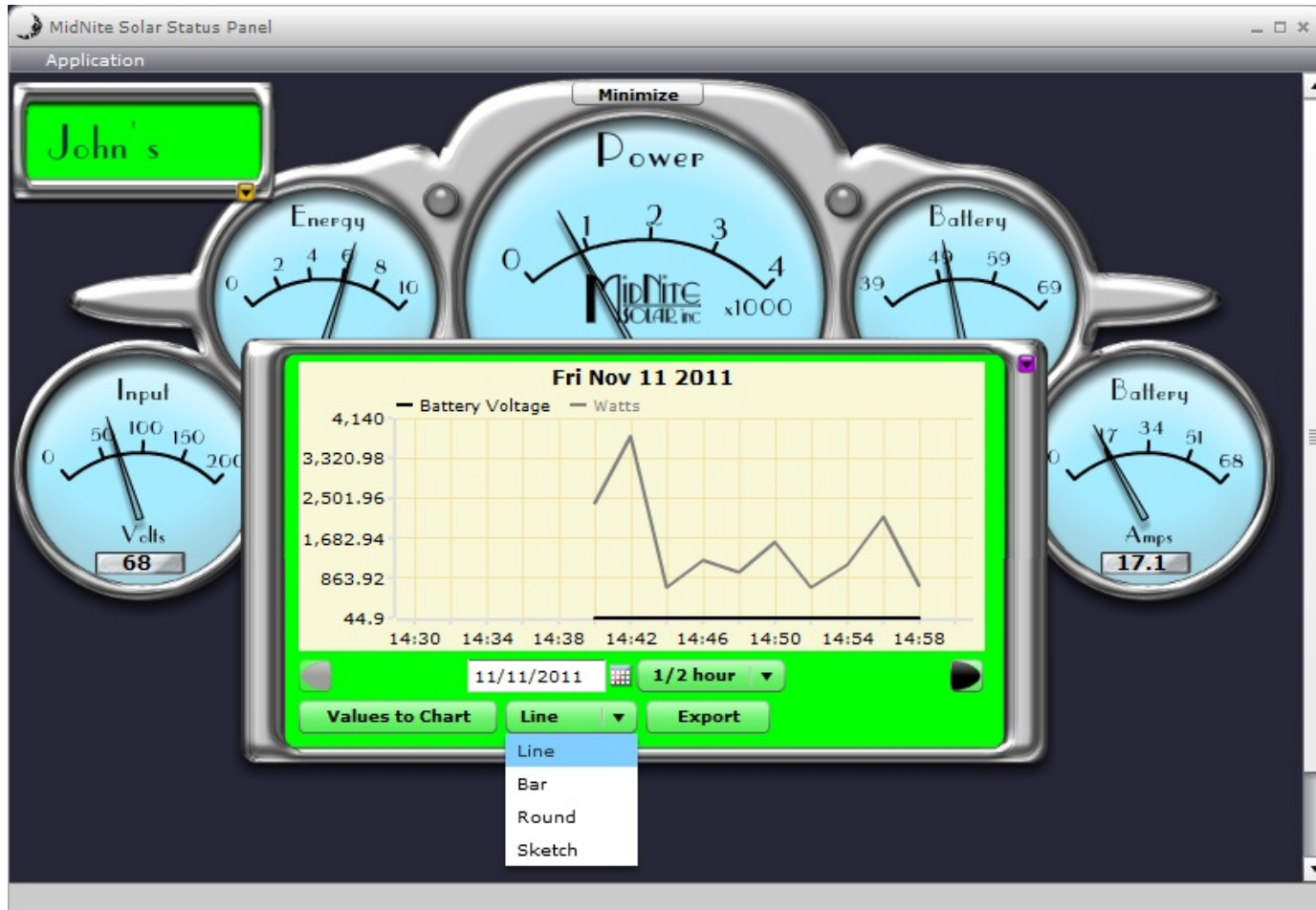
Wattage for a 24hr period
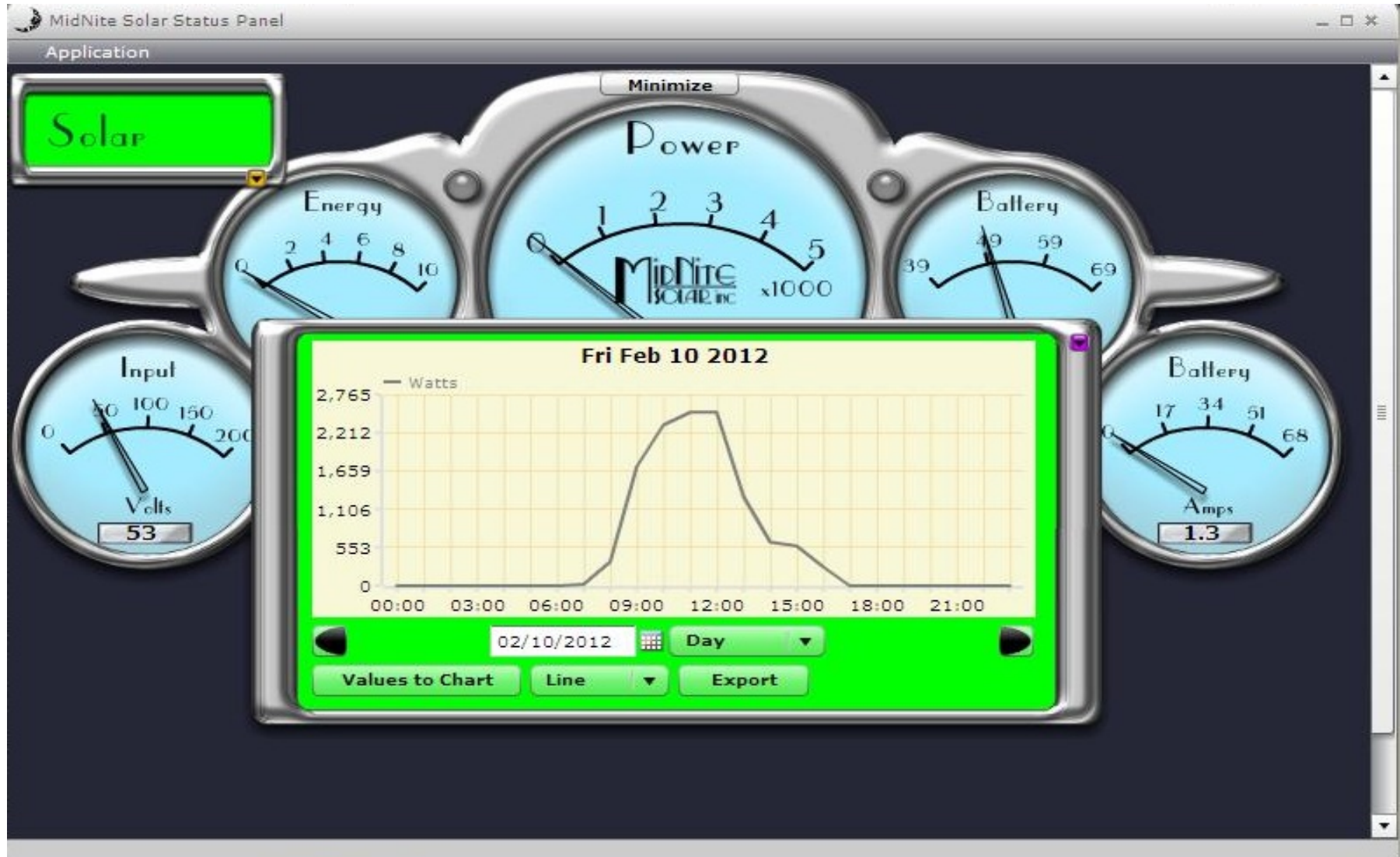
More Graphing options.
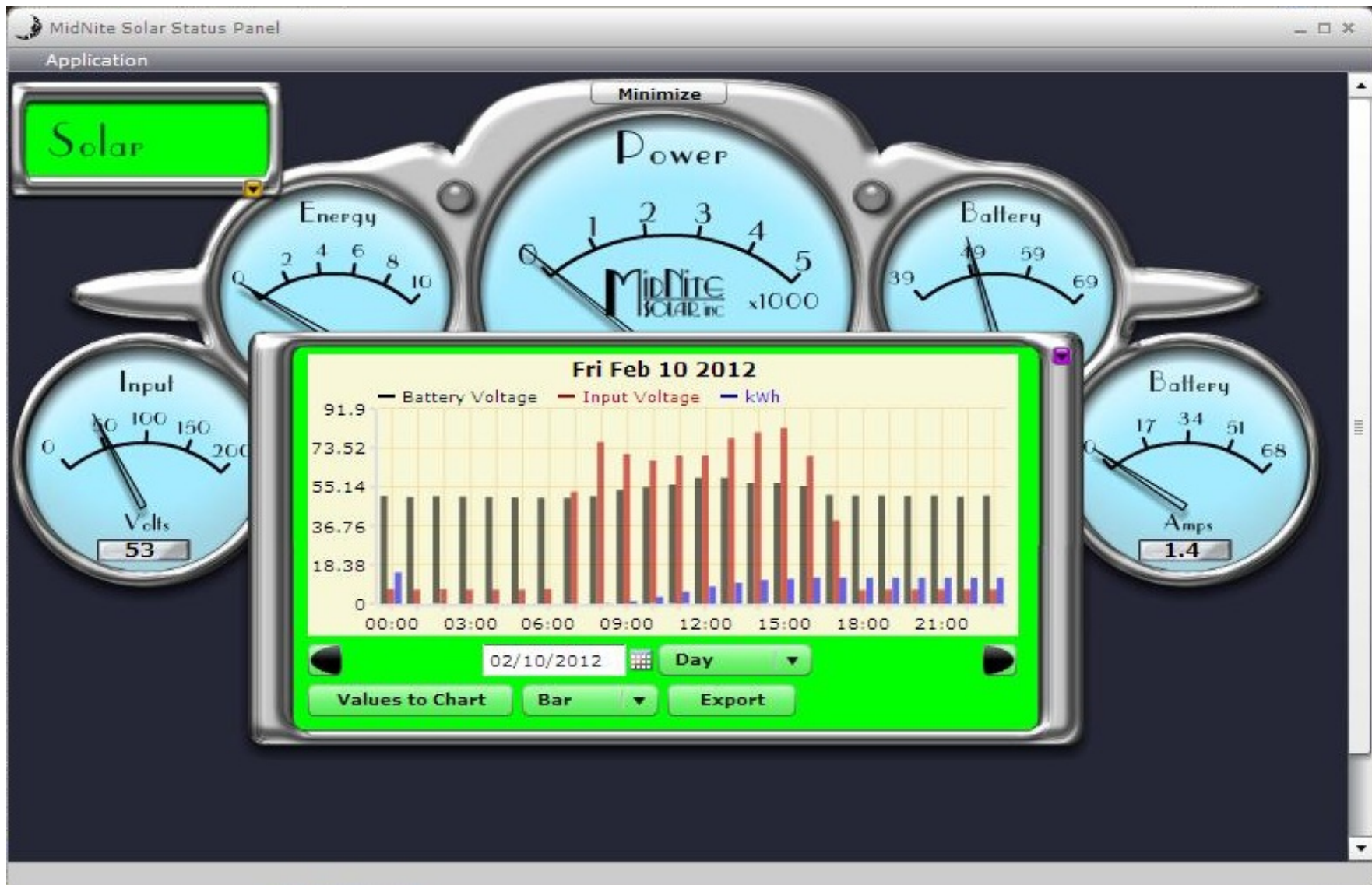
2 way communications as well.

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

CLASSIC SIZING TOOL

PV Module Data

Power:	220	Watts
VOC (Open Circuit Voltage):	37.6	Volts
VMP (Maximum Power Point Voltage):	30.6	Volts
ISC: (Short Circuit Amperage)	8.22	Amps
IMP (Maximum Power Point Amperage):	7.87	Amps
VOC Temp Coef %:	0.33	C°
VMP Temp Coef %:	0.45	C°

Environmental Data

Coldest Ambient Temperature:	-30	C°
Hottest Ambient Temperature:	40	C°
Nominal Battery Volts:	48	Volts

PV Array

Number Of Modules In Series:	5	
Number Of Parallel Strings:	4	
Total Modules	20	
Rated PV Array Power:	4400	Watts
Anticipated Array Power @ 40C:	4103	Watts
Rated PV Array Current:	31.48	Amps
Battery Charging Current @ 57.6 V:	76.4	Amps
VMP (Maximum Power Point Voltage) :	153	Volts
VOC (Open Circuit Voltage):	188	Volts
VMP @ -30 C°:	191	Volts
VOC @ -30 C°:	222	Volts

Charge Controller Selection	Classic150/Lite	Classic200/Lite	Classic250/Lite	Classic250KS
Max Operating Voltage	150	200	250	250
Max Non operating VOC (HyperVOC) @ 48V Nominal Battery Voltage	198	248	298	298
Maximun Number Of Modules In Series	3	4	5	5
Max Number Of Modules In Series (Using HyperVOC)	4	5	6	6
Max Allowable Output Current Per Classic Based On This Current Configuration	76	65	55	50
Max Allowable Wattage Per Classic Based On This Current Configuration	4438	3796	3212	2900
Present PV Array Wattage Of This Configuration	4400	4400	4400	4400

Design Check

	Classic150/Lite	Classic200/Lite	Classic250/Lite	Classic250KS
Max VOC	TOO HIGH	MARGINAL (HyperVOC)	OK	OK
Temperature The Classic Will Enter HyperVOC	N/A	6 C°	-75 C°	-75 C°
Array Power (Wattage)	OK	EXCESSIVE	EXCESSIVE	EXCESSIVE
Classics Required	1	1.2	1.4	1.6

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Arlington, WA 98223
Ph. 360-403-7207
Fax 360-691-6862
www.midnitesolar.com

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

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
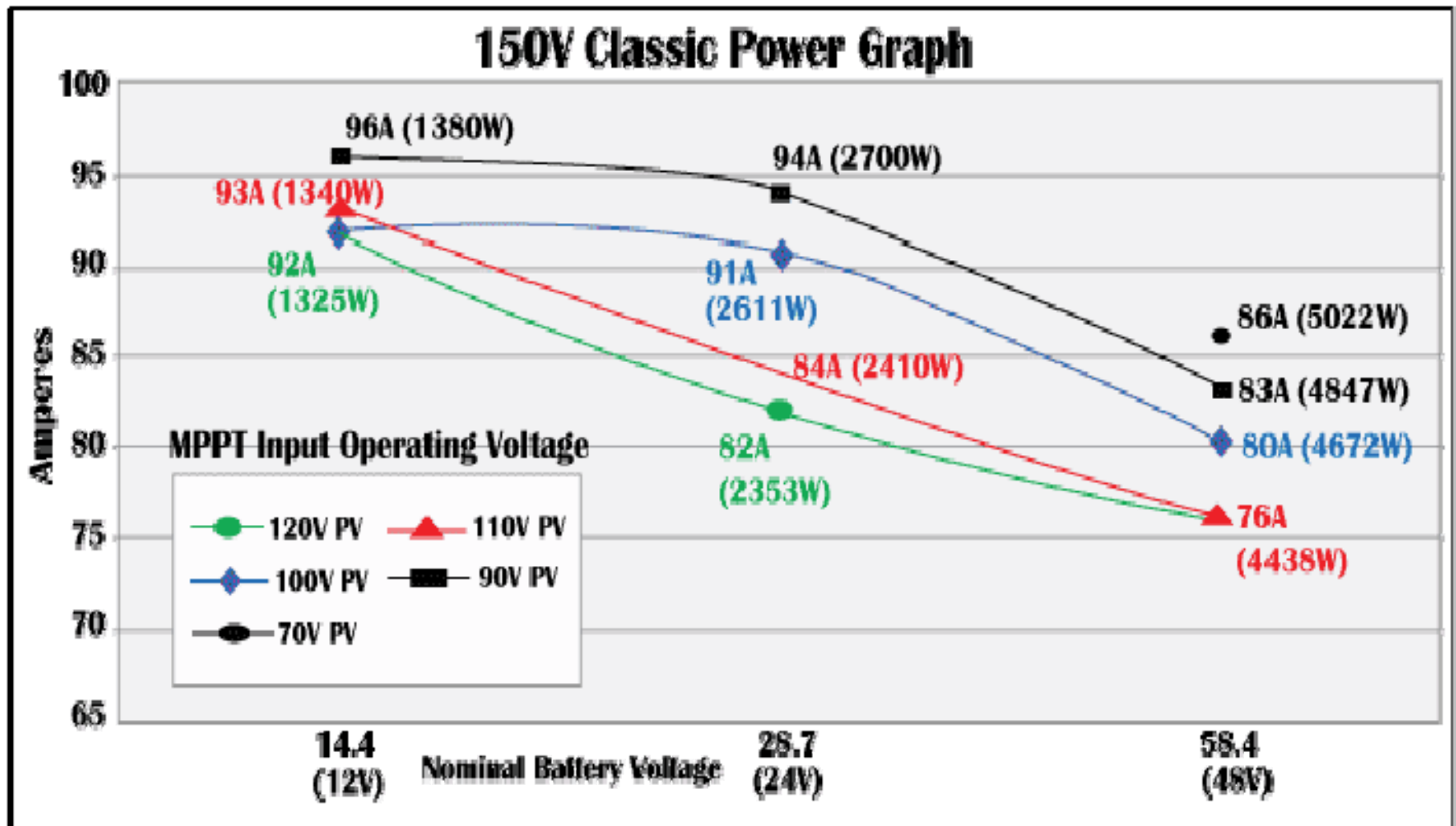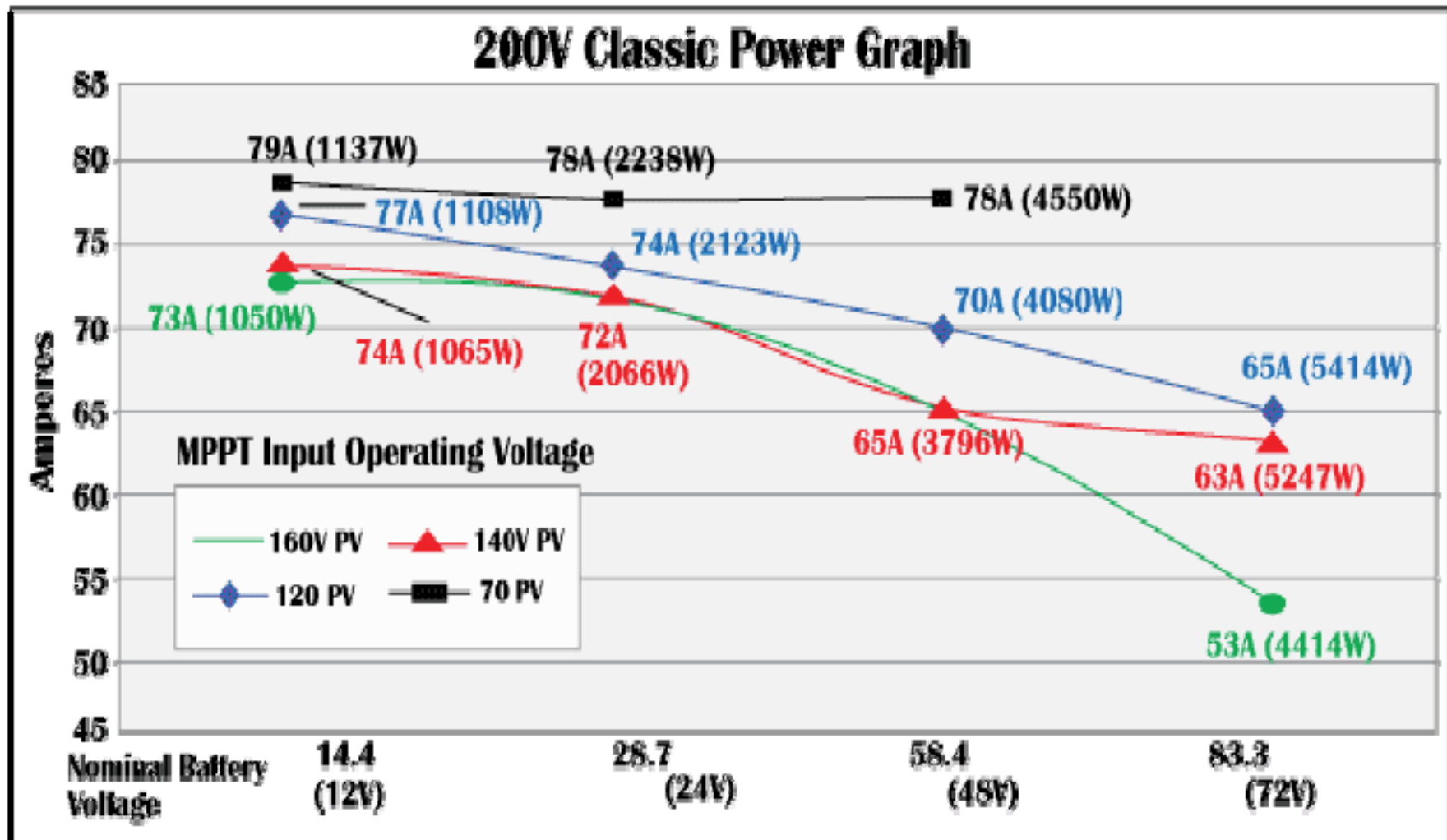
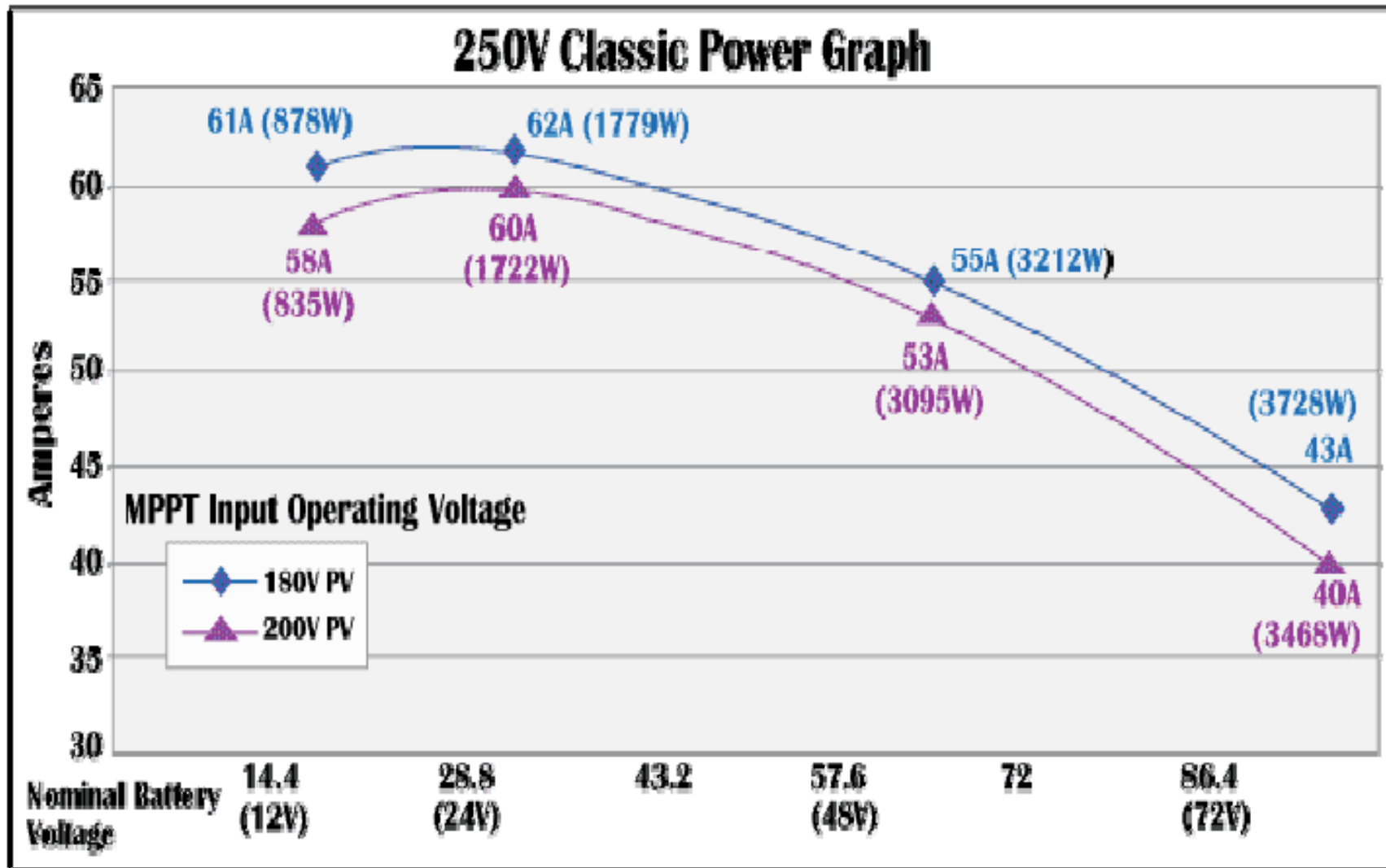# An installation in OZ

An Island
off the
East
Coast
(30
Classics)

Classic 150 power graph

Classic 200 power graph

200V Classic Power Graph

 Amperes (y-axis) vs Nominal Battery Voltage (x-axis)

MPPT Input Operating Voltage legend:
- 160V PV (green)
- 140V PV (red)
- 120 PV (blue)
- 70 PV (black)

Data points:
- 79A (1137W)
- 78A (2238W)
- 78A (4550W)
- 77A (1108W)
- 74A (2123W)
- 73A (1050W)
- 74A (1065W)
- 72A (2066W)
- 70A (4080W)
- 65A (5414W)
- 65A (3796W)
- 63A (5247W)
- 53A (4414W)

X-axis (Nominal Battery Voltage): 14.4 (12V), 28.7 (24V), 58.4 (48V), 83.3 (72V)

Classic 250 power graph

250V Classic Power Graph

- 61A (878W)
- 62A (1779W)
- 58A (835W)
- 60A (1722W)
- 55A (3212W)
- 53A (3095W)
- (3728W) 43A
- 40A (3468W)

Amperes (y-axis): 30, 35, 40, 45, 50, 55, 60, 65

MPPT Input Operating Voltage
- 180V PV
- 200V PV

Nominal Battery Voltage (x-axis): 14.4 (12V), 28.8 (24V), 43.2, 57.6 (48V), 72, 86.4 (72V)

Classic 250KS

250VKS Classic Power Graph

Operating Voltage

- 180V PV
- 200V PV

56A (800W)
53A (750W)
58A (1660W)
56A (1600W)
50A (2900W)
48A (2800W)
35A (5000W)
35A (5000W)

Amperes

Battery Voltage

* Nominal Battery Voltage

| 14.4 | 28.7 | 58.4 | 143.3 |
| *(12V) | *(24V) | *(48V) | *(120V) |
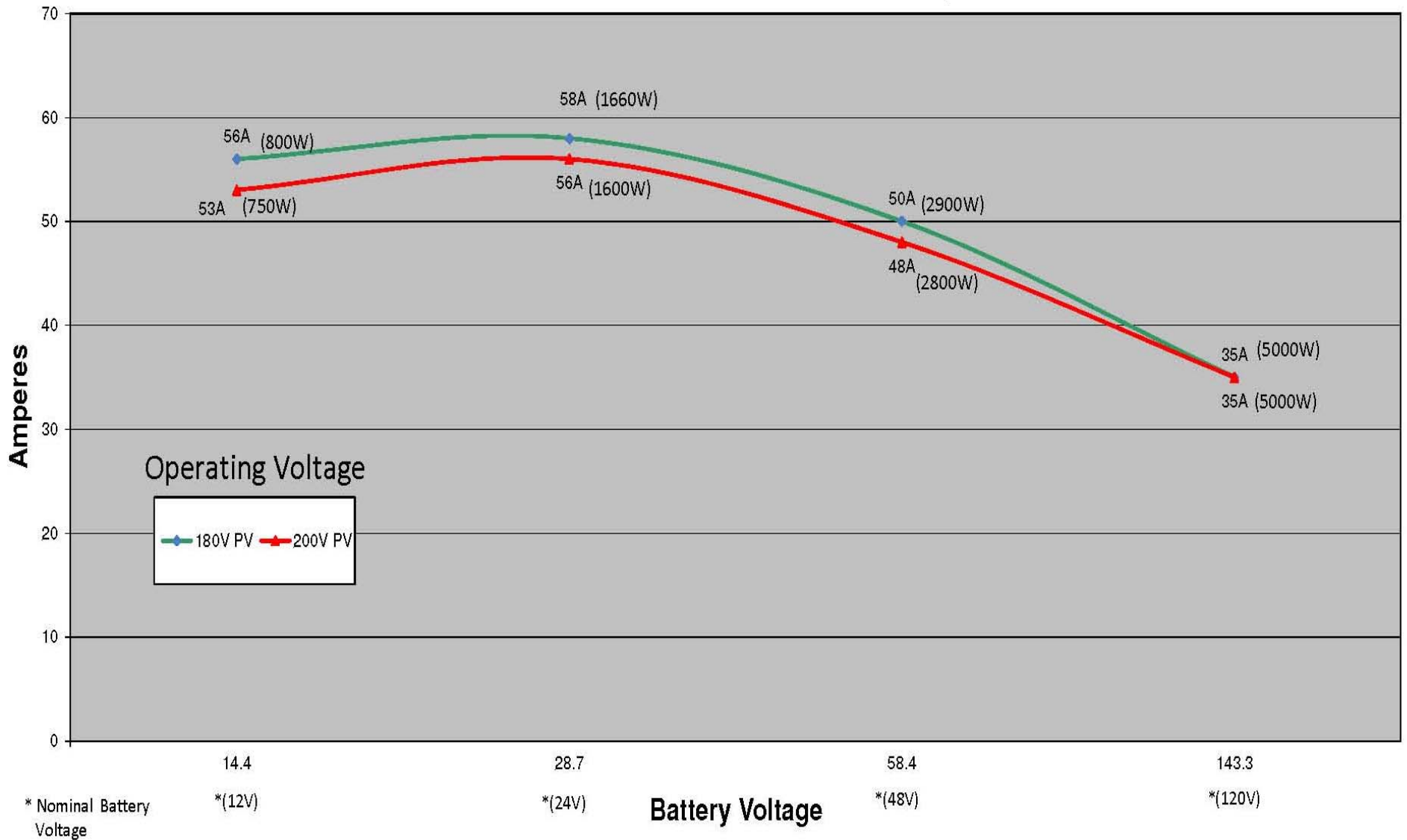
Top line = MPPT on wind turbine
Bottom line = battery connected turbine
This graph is made from actual data – lots more power
The Classic for wind can double or triple turbine output power

Axial Flux Wind MPPT
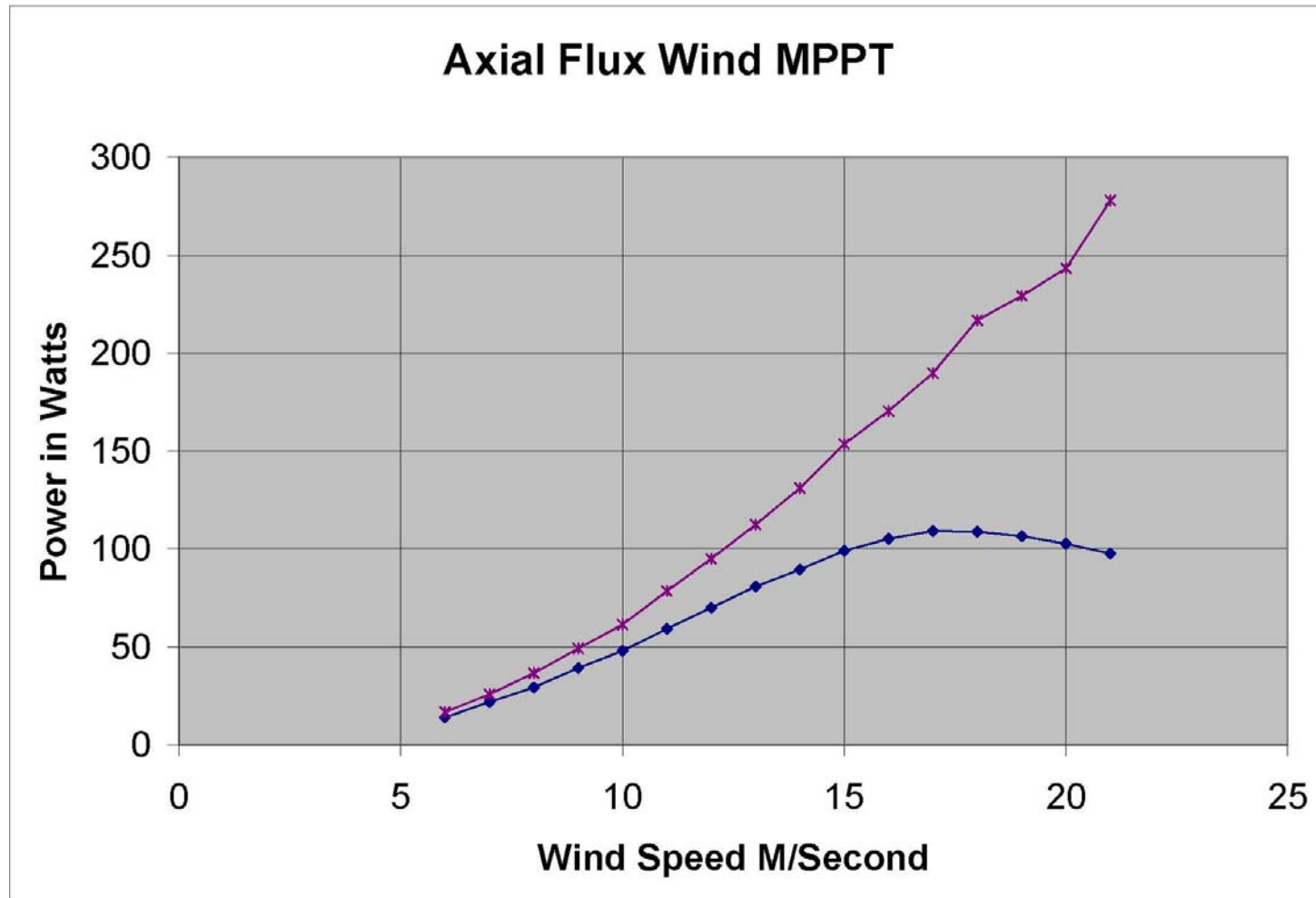
This scope photo shows the wind turbine output being clipped at 120VDC.
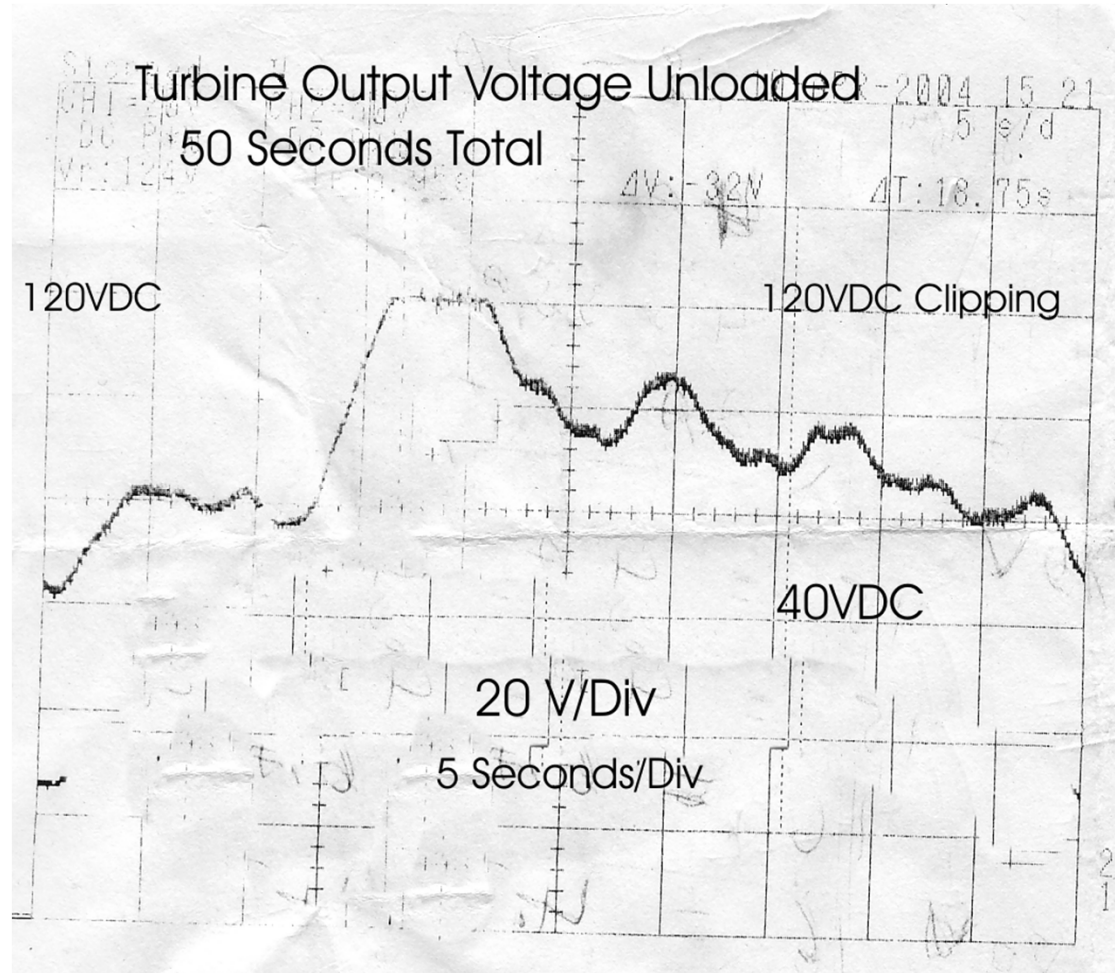
The MidNite Clipper

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
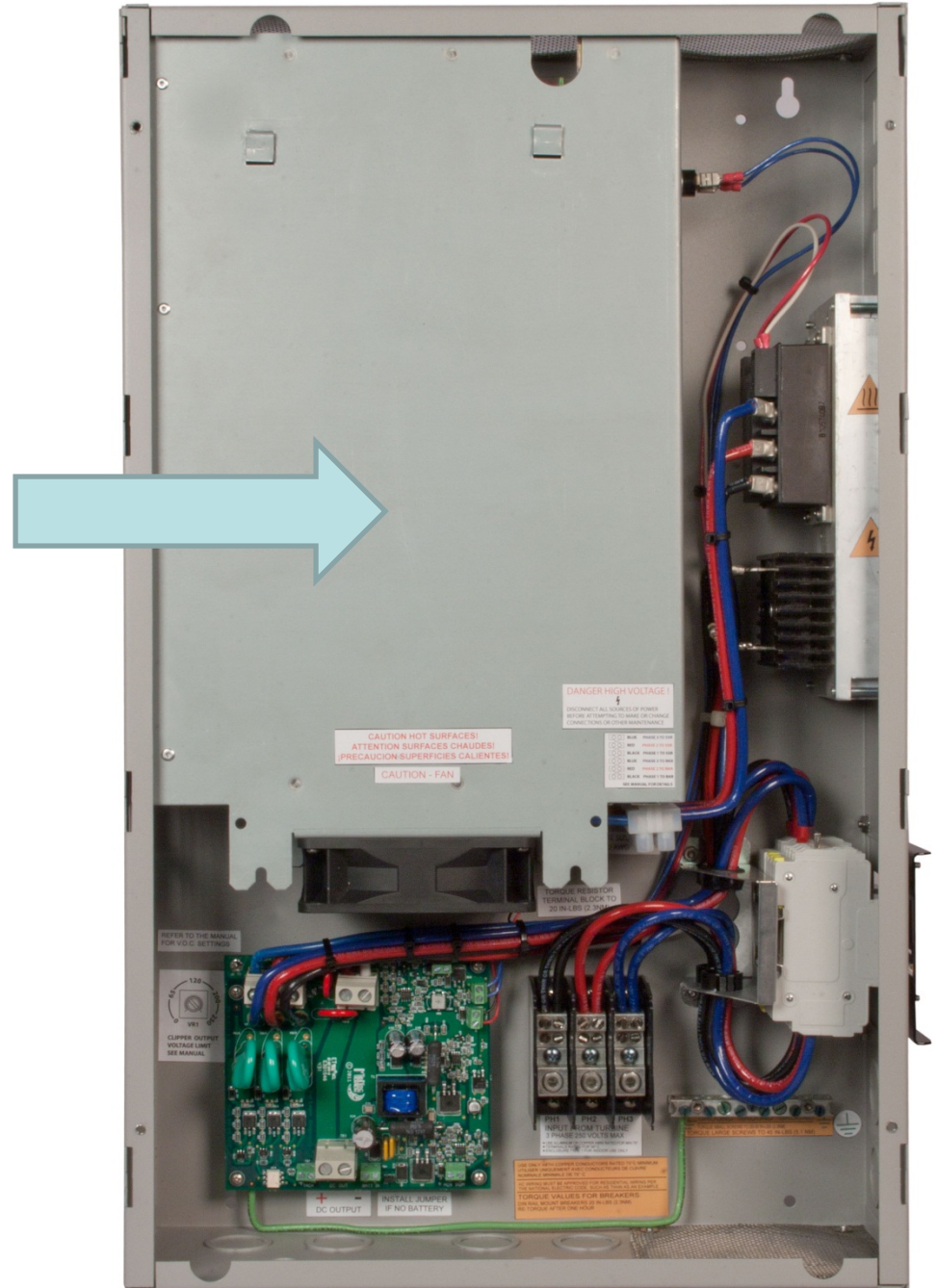
Look for Rosie to come alive in an upcoming Classic video

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
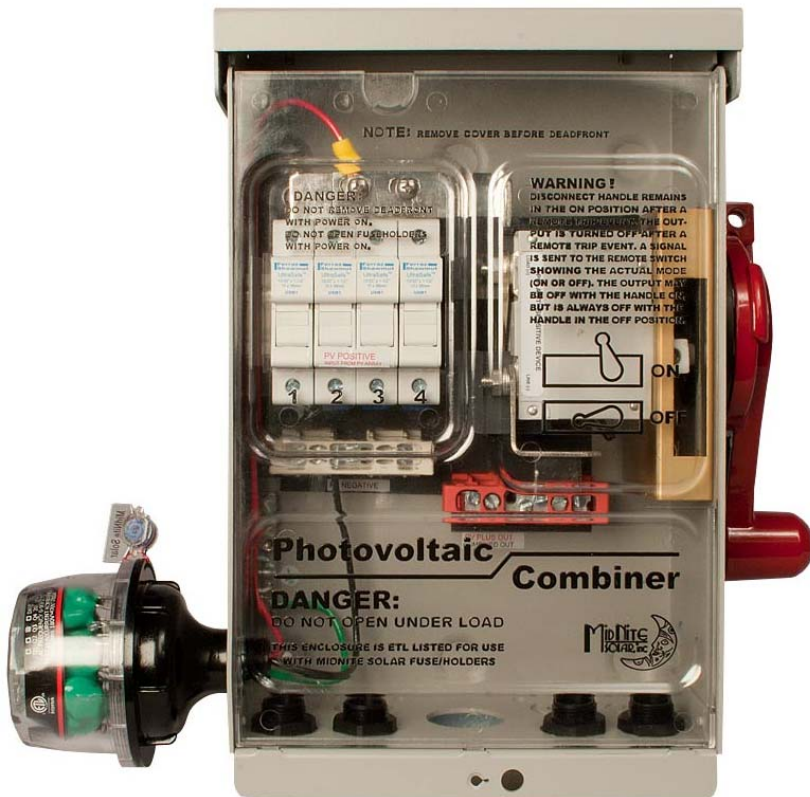
MNPV6 Disco combiner Micro
Combines three strings of Enphase inverters

The MidNite kitty