

eGSE Integrated Charging Solutions Training



Adesh Shah
Director
Transtec Overseas India Pvt. Ltd
February 2017

Training Agenda

1. AV Corporate Overview

- a. UAS Products
- b. EES Products

2. Application Engineering Support and Sales Tools

- a. Sales Tools

3. Detailed Product Line Review

- a. eGSE Charger Line
- b. Battery Rx and PosiNet Back-Office

4. Energy Storage Overview

- a. Lithium Batteries
- b. Lithium Link

5. Competitive Overview

- a. Minit Charge - Atlus

6. Charger Installation

- a. Cable Management

7. Charger Troubleshooting and Service

AeroVironment

Battery and Energy Experts with a History of Innovation



45 years of innovation

- **Established** **1971**
- **Employees** **700**
- **NASDAQ** **AVAV**
- **Market Cap** **\$615M**
- **FY16 Revenue** **\$270M**
- **6 Vehicles in the Smithsonian**
- **Time Magazine named our founder one of the “100 Greatest Minds of the 20th Century”**

The Smithsonian Collection



Gossamer Condor	First human-powered flight
Gossamer Albatross	First human-powered flight across the English channel
Solar Challenger	Solar-powered airplane, Paris to England
QN	Flying pterodactyl for IMAX
Sunrayer	Solar-powered car; Darwin to Adelaide Australia race winner
Pathfinder	Solar-powered airplane, connectivity at 65,000 feet



AeroVironment

Battery and Energy Experts with a History of Innovation



40 years of innovation

Unmanned Aircraft Systems



Small electric unmanned aircraft systems



Large hybrid unmanned aircraft systems



Small aircraft systems

Efficient Energy Systems

PosiCHARGETM
AeroVironment



Industrial Charging Stations



Advanced Electric Propulsion Test Systems



Passenger EV Charging Solutions



Advanced Engineering Services

PosiCHARGETM
AeroVironment

UAV's – Unmanned Aerial Vehicles

Qube



SUAS

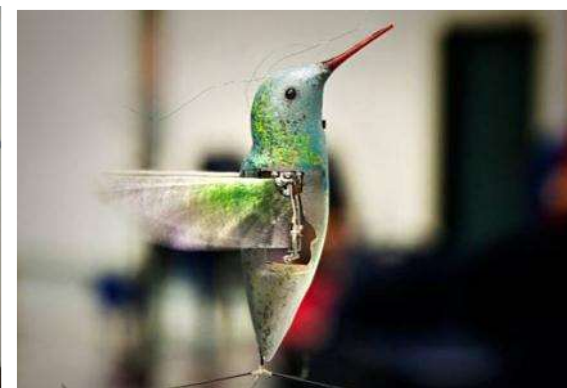


Global Observer



Services

Switchblade

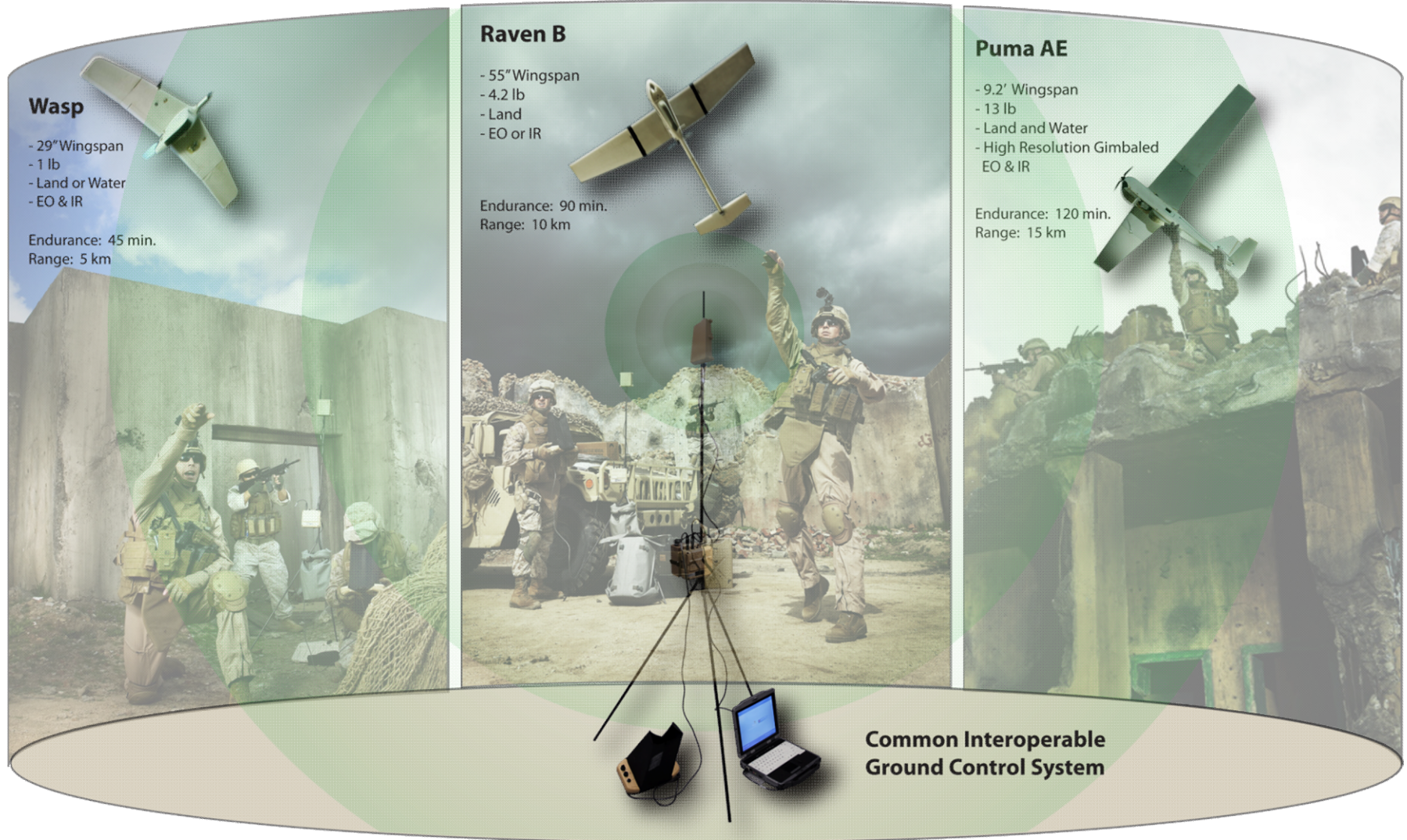


Advanced Systems

PosiCHARGE™
AeroVironment®

SUAS Overview

Family of systems



Wasp

- 29" Wingspan
- 1 lb
- Land or Water
- EO & IR

Endurance: 45 min.
Range: 5 km

Raven B

- 55" Wingspan
- 4.2 lb
- Land
- EO or IR

Endurance: 90 min.
Range: 10 km

Puma AE

- 9.2' Wingspan
- 13 lb
- Land and Water
- High Resolution Gimbaled EO & IR

Endurance: 120 min.
Range: 15 km

Common Interoperable Ground Control System

HALE Program

Global Observer: Affordable Pseudo-Satellite Capability



EV Solutions Overview



Preproduction model shown. Final production model may vary.
© 2009 AeroVironment, Inc.

EV Solutions

Electric Vehicle Charging Solutions



■ On & Off-road Electric Vehicle (EV) Charging Solutions

- Wide range of charging solutions (from slow to fast charging)
- AeroVironment builds charging stations, networks & eco-systems



■ Experience: Customers & Installations

- Preferred charging solution provider for:



- Over 40,000 Electric Vehicle Supply Equipment (EVSE) sold
- Over 5,000 residential installations nationwide
- Over 10,000 Auto Dealerships Installations nationwide

■ Key Infrastructure Programs

- **Hydro Quebec** – Public EV infrastructure program “*Le Circuit électrique*”
- **California Energy Commission** – Residential and fleet EV infrastructure program
- **Bay Area AQMD** – Residential EVSE and public DC Fast Chargers incentive program



EV Solutions

TurboCord and TurboDock



Simple Access Control.

Broadcasting TurboDock uses Bluetooth Low Energy (LE) for access control*, eliminating the need for costly annual fees.



Modular.

Maximum flexibility for a wide variety of parking configurations. Scales easily with growth.



Configurable.

Set up each charger for either Open Access, one code for all drivers or individual codes for each driver. You decide.



Upgradeable.

Easily download future software upgrades right from the smartphone app.

West Coast Electric Highway

Public – Private Partnership Between WSDOT / ODOT and AV



- 500 mile Electric Highway
- Single point of responsibility
- Develop, own and operate
- Turnkey service
 - EV Charging Equipment
 - Installation Services and O&M
 - Networking and back office
- 28 ODOT Locations
- 24 WSDOT Locations



WEST COAST
ELECTRIC
HIGHWAY



Power Processing Test Equipment



Power Processing Products

Applications Overview

- Battery Cycling
- H/EV Development
- Battery Emulation
- Drivetrain Emulation
- Fuel Cell Testing
- Component Testing



Power Processing

DC Product Line



MT-30



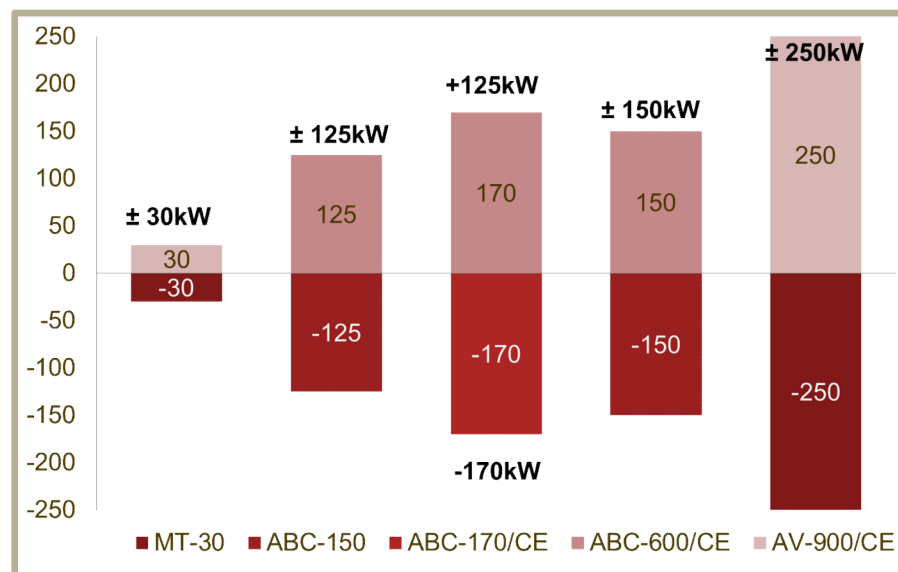
ABC-150 & ABC-170



ABC-170CE



AV-600 & AV-600CE



AV-900 EX

Power Processing Test Equipment

A Sample of our Customers

A123
ABB
Adam Opel AG
A&G Technology, Ltd
Agency for Defense Development
Allison Transmission

EnerDel
FAW
FEV
Ford Motor Company
GE India
General Dynamics

Nissan
Nuvera Fuel Cell
Penn State University
Plug Power
Power Logics Co.
Red Bull F1

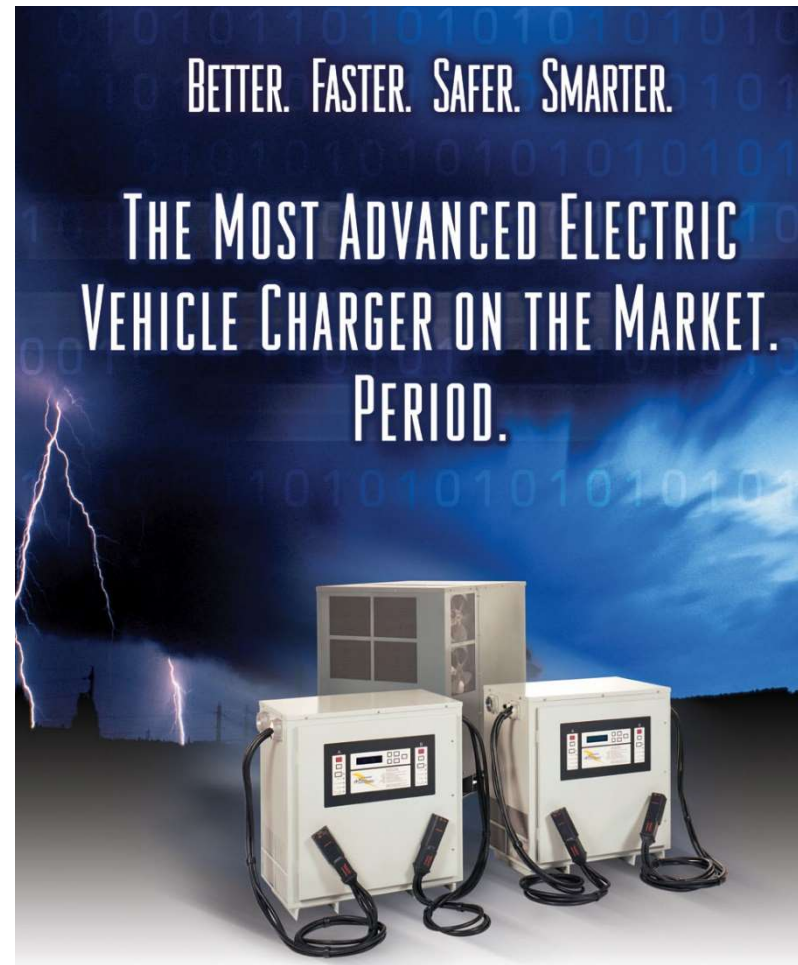


Compact Power, Inc.
Cummins Engines
Daimler
Daewoo Shipbuilding
Delphi
Denso
Dominion Virginia Power
Dongfeng
DRS Test & Energy Mgmt, Inc.
East Penn Manufacturing Co.
Eaton Corporation

Korea Automotive Technology Institute
Korea Institute of Energy Research (KIER)
L3 Communications
LG Chem, Ltd.
Maxwell Energy Products
Magna Electronics
NASA Glenn Research Center
National Renewal Energy Laboratory (NREL)
National Automotive Center (NAC)
Naval Surface Warfare Center
NESSCAP Co.

Toshiba Battery
Tsinghua University
TUV SUD
U.S. Army
U.S. Department of Energy
UTC Fuel Cells
Volkswagen
Volvo Car Corporation
Wanxiang
Williams F1
Xuji

PosiCharge System Solution



PosiCHARGE™
AeroVironment®



The PosiCharge Advantage

■ Experience and Expertise

- Largest supplier of intelligent charging systems to Fortune/Global 1000
- More than 22,000 chargers supporting 25,000+ industrial vehicles since 1999
- Over 3,500 chargers in service at airports and airlines around the world
- Advanced battery research center with 20+ years of test data and experience

■ Reliability

- Chargers in continuous operation for more than 17 years
- Proven to extend battery life* and surpass battery warranties

■ Breadth of Applications

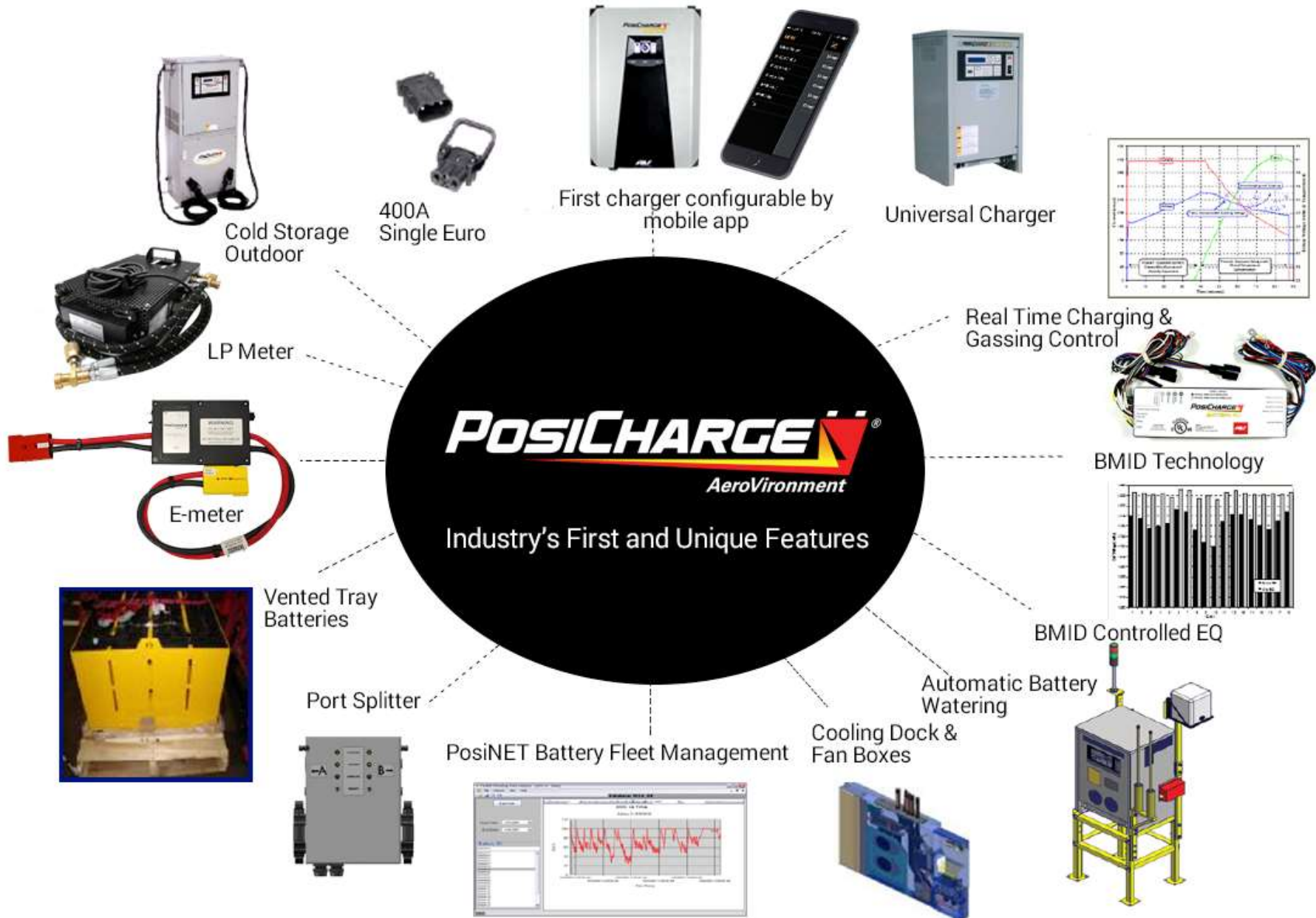
- Only solution with automatic battery watering
- Only thermal management solution for heavy-use vehicles
- Universal battery charging: any battery chemistry, brand, size, voltage

■ Corporate Strength

- Financial strength and stability (AVAV on NASDAQ)

** Independent third-party load test of 3-year old battery at SYSCO Food Service; results yielded 92% capacity retention*







CHARGING SOLUTIONS

Product Line Overview



DIAGNOSTIC TOOLS



LP meter

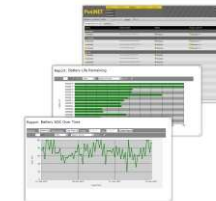


E-meter

FLEET MANAGEMENT TOOLS



BMID and
Battery Rx



PosiNET

ACCESSORIES



Port splitter



Auto-watering kit



Plug-n-Charge



Thermal management



Application Engineering

Electric Trucks

Customer Qualification Process

■ Site Survey

- Capture operation schedule
- Determine if there is any peak or seasonal activity during the year
- Get a copy of customer's monthly fuel and or utility bill
- Survey electrical infrastructure
- Survey battery room or LP refueling area
- Install Meter
- Determine where the trucks park during breaks, lunches or shutdowns

OPERATIONS PROFILE			
Please complete the yellow highlight boxes only			
Furniture Row - Dayton			
East			
Truck Location	Y	Z	
Vehicle Type	Crown FC8000	Crown FC9000	
Number of Vehicles	25	25	
Off-duty per Year	45	45	
Shifts/Weekend/Year	250	250	
Number of Scheduled Stops per Day/Year			
Number of Scheduled Number of Shifts/Charges Per Day	1.5	1.50	
Number of Scheduled Supervised Shifts/Charges per Day	0.0	0.0	
Cost Charge Battery - Number of Hours	28	30	
Cost Charge Battery - Number of Hours	8	0	
Cost Charge Vehicle - Number of Hours	28	30	
Cost Charge Vehicle - Number of Hours	8	0	
Schedule			
Days per Week	4	4	
Hours per Year	45	45	
Shifts/Weekend/Year	250	250	
Shift Duration in Hours	8	8	
Number of Shifts per Shift	1	1	
Number of Shifts in minutes	15	15	
Number of Shifts per Shift	1	1	
Duration of a Shift in minutes	30	30	
Number of Shift Charges	1	1	
Duration of Shift Change in minutes	15	15	
Total Break and Shift Change in minutes	135	135	
Total Shutdown Time per Day in Hours	0	0	
Total Available Charge Time (Hours/Day)	16.5	16.5	
Cost Charge per Hour at Same Time	0.00	0.00	
Cost Charge per Hour at Same Time	0.00	0.00	

[illegible]

E-meter IV

Wireless Industrial Vehicle Energy Monitor



Applications:

- Truck utilization / fleet optimization
- Truck energy consumption
- Charger system configuration
- Battery health analysis
- Charger performance



Benefits:

- Installs in minutes
- Plug-n-play data reporting
- Compatible with a wide array of equipment, from a 24V pallet jack up to a 80V forklift.
- Identifies truck, operator, and process efficiencies

Specifications	E-Meter IV
DIMENSIONS	1.5" x 6.5" x 9.5"
INPUT VOLTAGE	24-96VDC nominal
CONNECTORS	SB350
CABLE SIZE	≥ 3/0 welding cable
PEAK CURRENT	1000 amps

Standard Features:

- Cellular data upload for PosiNet users.
- Usage report delivered at end of testing period.
- Ability to record up to 4 weeks of data
- Compact box design - fits right into the battery compartment.

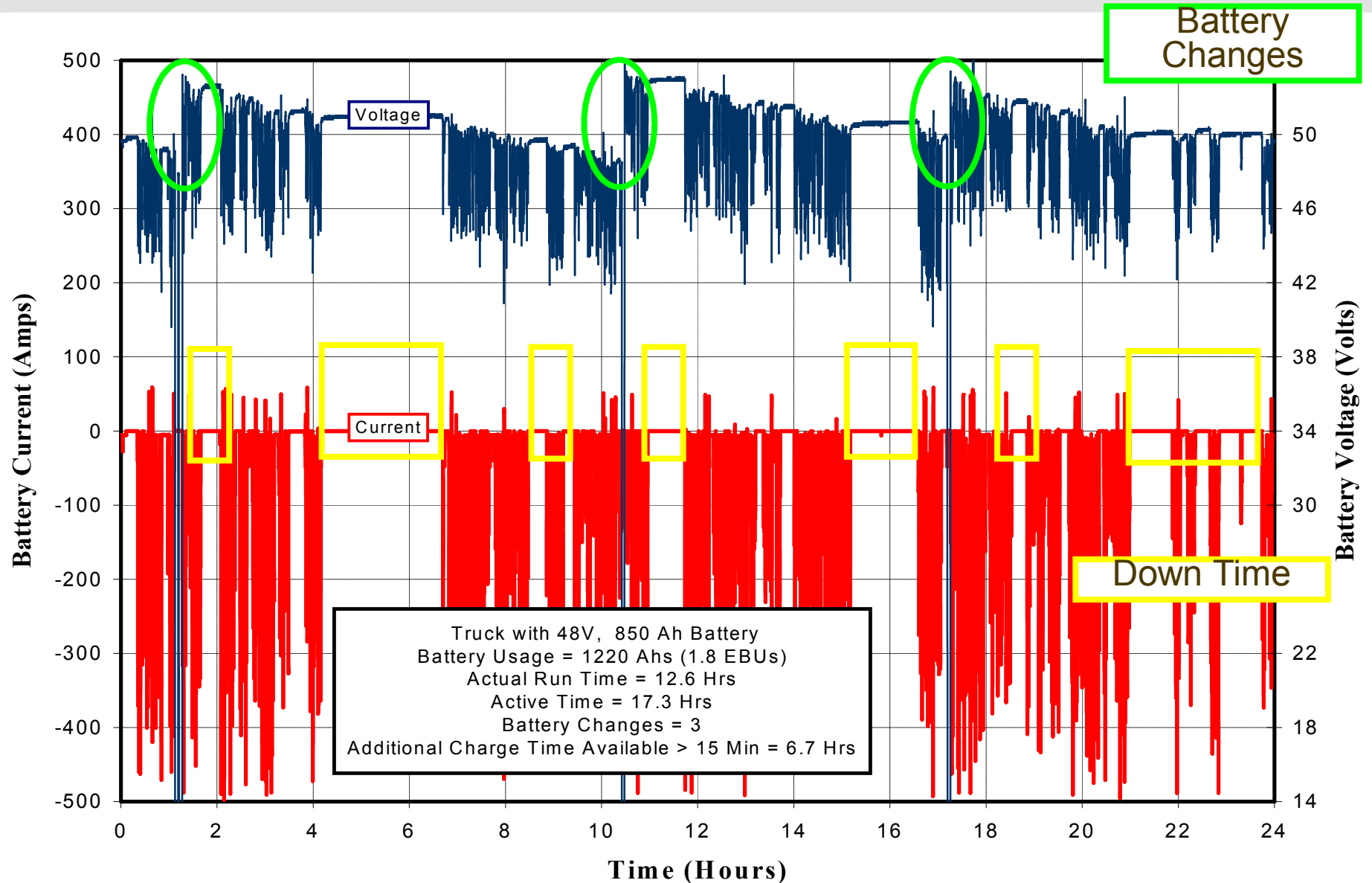
E-Meter: Daily Usage, Run Time and Available Charge Time



Day	Ahs	kWhs	Run Time	Idle Time	Charge Time
Thursday	-1258.2	-43.4	12.9	11.1	8.0
Friday	-1336.2	-45.5	10.9	13.0	10.4
Saturday	-441.1	-15.0	4.3	19.7	18.8
Sunday	-240.7	-8.5	1.8	22.1	20.2
Monday	-559.8	-19.4	8.5	15.4	12.6
Tuesday	-1588.9	-51.3	13.7	10.2	6.5
Wednesday	-755.7	-26.2	6.6	17.3	15.7

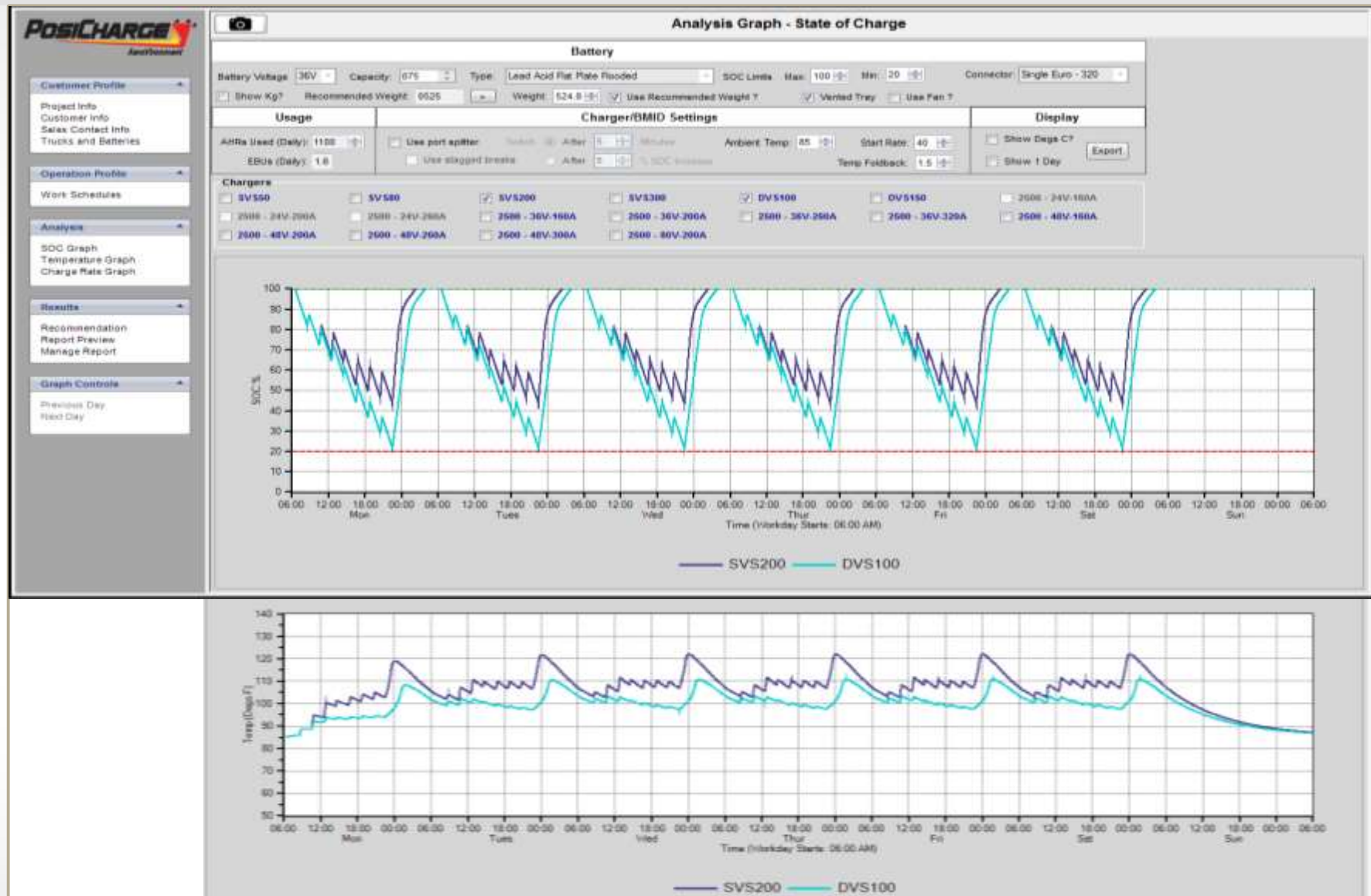
- ▶ Ahs & kWhs – Total energy Usage per day
- ▶ Run Time – Total time truck is operating per day
- ▶ Idle Time – Total time truck is idle per day
- ▶ Charge Time – Sum of the idle times greater than 15 minutes per day

E-meter Data provides Complete Understanding of the Usage and Charge Time



Charging System Configurator

Battery SOC and Temperature Simulation





GSE Product Line

PosiCharge GSE Product Family



POSICHARGE
SVS



POSICHARGE
DVS/MVS



POSICHARGE
MVS

The Right Charger for every Application:

- **SVS 100:** 10 kW **single port** chargers
- **DVS/MVS:** 30/40 kW **dual and multi-port** port chargers
 - 2 to 6 port systems
- **MVS:** 80 kW **multi-port** chargers
 - 6 to 12 port systems

PosiCharge SVS (Single Vehicle System) Specifications

POSICHARGE™ SVS100

eGSE

1

INTELLIGENT

Smart Battery Monitor and Identification Device (BMID) instantly recognizes voltage, state of charge, temperature

2

MULTI VOLTAGE / MULTI-AH CAPABILITIES

Allow different vehicles/batteries to charge on the same charger

3

CUSTOMIZED

Adapts charge rate according to charge acceptance limit and temperature for safest fast charge

4

BMID CONTROLLED EQ

Allows any battery to go to any charger and get a complete EQ each week

5

RUGGED NEMA 3R ENCLOSURE RATING

Provides all environment/weather operation and conditions



6

SAFE

Automatic Start/Stop, Anti-arcing Disconnect & Auto Thermal Shutdown

7

EFFICIENT

High efficiency IGBT technology

8

COMPACT

Fits almost anywhere

9

EASY

Easy to install, easy to use



PosiCharge SVS (Single Vehicle System) Specifications

SVS100	
POWER RATING	10kW
UTILITY REQUIREMENTS*	480/600 VAC, 3-PHASE
FULL LOAD AMP DRAW	15A / 12A MAX
MAX CIRCUIT BREAKER RATING	20A / 15A
POWER FACTOR	0.98
EFFICIENCY	91%
BATTERY VOLTAGE RANGE	24V - 80V
MAX OUTPUT CURRENT	250A
WEIGHT	388 LBS
DIMENSIONS	39.4"H X 22"W X 19.3"D

HIGHEST SAFETY STANDARDS: CE, UL1012, CSA

Key Options:

- CEC
- Battery Rx and PosiNet



DVS (Dual Vehicle System) Specifications

POSICHARGE™ DVS 300/330/400

eGSE

1

INTELLIGENT

Smart Battery Monitor and Identification Device (BMID) instantly recognizes voltage, state of charge, temperature

2

MULTI VOLTAGE / MULTI-AH CAPABILITIES

Allow different vehicles/batteries to charge on the same charger

3

CUSTOMIZED

Adapts charge rate according to charge acceptance limit and temperature for safest fast charge

4

BMID CONTROLLED EQ

Allows any battery to go to any charger and get a complete EQ each week

5

RUGGED NEMA 3R ENCLOSURE RATING

Provides all environment/weather operation and conditions



6

SAFE

Automatic Start/Stop Anti-arcing Disconnect & auto thermal shutdown

7

PARALLEL CHARGE

Can charge 2 vehicles simultaneously or one vehicle twice as fast

8

POWER SHARE

Can share power with the jet Bridge or other devices to reduce installation costs

9

EASY

Easy to install, easy to use

10

EFFICIENT

High efficiency IGBT technology



DVS (Dual Vehicle System) Specifications

	DVS300	DVS330	DVS400
POWER RATING	30kW	33kW	40kW
UTILITY REQUIREMENTS*	480/600 VAC, 3-PHASE 60 HZ	380 VAC, 3-PHASE 50 HZ	480/600 VAC, 3-PHASE 60 HZ
FULL LOAD AMP DRAW	40/32A	56A	56/45A
MAX CIRCUIT BREAKER RATING	50/40A	70A	70/60A
POWER FACTOR	0.96	0.96	0.96
EFFICIENCY	90%	90%	90%
BATTERY VOLTAGE RANGE	24V - 96V	24V - 96V	24V - 96V
MAX OUTPUT CURRENT (DUAL MODE)	250A	250A	250A
MAX OUTPUT CURRENT (SINGLE MODE)	500A	500A	500A
WEIGHT	905 LBS	905 LBS	915 LBS
DIMENSIONS	60"H X 32.4"W X 21.9"D	60"H X 32.4"W X 21.9"D	60"H X 32.4"W X 21.9"D
COMMUNICATION PORT	RS232	RS232	RS232
HIGHEST SAFETY STANDARDS: CE, UL1012, CSA			

Key Options:

- CEC
- Power Share
- Battery Rx and PosiNet



MVS (Multi-Vehicle System) Specifications

POSICHARGE™ MVS 800

eGSE

- 
- 1 INTELLIGENT**
Smart Battery Monitor and Identification Device (BMID) instantly recognizes voltage, state of charge, temperature
 - 2 MULTI VOLTAGE / MULTI-AH CAPABILITIES**
Allow different vehicles/batteries to charge on the same charger
 - 3 CUSTOMIZED**
Adapts charge rate according to charge acceptance limit and temperature for safest, fast charge
 - 4 BMID CONTROLLED EQ**
Allows any battery to go to any charger and get a complete EQ each week
 - 5 RUGGED NEMA 3R ENCLOSURE RATING**
Provides all environment/weather operation and conditions
 - 6 SAFE**
Automatic Start/Stop Anti-arcing Disconnect & auto thermal shutdown
 - 7 PARALLEL CHARGE**
Can charge 2 vehicles simultaneously or one vehicle twice as fast
 - 8 EFFICIENT**
High efficiency IGBT technology
 - 9 EASY**
Easy to install, easy to use
 - 10 POWER SHARE**
Can share power with the jet Bridge or other devices to reduce installation costs



MVS (Multi-Vehicle System) Specifications

MODEL MVS800: POWERSERVER

POWER RATING	80kW
UTILITY REQUIREMENTS	480/600VAC, 3 PHASE
FULL LOAD AMP DRAW	100A / 80A
MAX CIRCUIT BREAKER RATING	125A / 100A
POWER FACTOR	0.96
EFFICIENCY	95%
WEIGHT	1,405 LBS
DIMENSIONS	62"H X 42"W X 27"D

POWERSTATION

POWER RATING	60kW
BATTERY VOLTAGE RANGE	24V - 96V
MAX OUTPUT CURRENT (DUAL MODE)	250A
MAX OUTPUT CURRENT (SINGLE MODE)	500A
WEIGHT	304 LBS
DIMENSIONS	30"H X 30"W X 19"D
COMMUNICATION PORT	RS232

HIGHEST SAFETY STANDARDS: CE, UL1012, CSA

Key Options:

- CEC
- Power Share
- Battery Rx and PosiNet



GSE Customers

Airlines

- American Airlines
- Delta Airlines
- United Airlines
- US AIRWAYS
- SkyWest
- Southwest
- Emirates
- FedEx
- Quantas
- Emirates
- Saudi Airlines

Handlers

- Menzies
- HAECO
- Hong Kong Airports Services
- Singapore Airport Services
- Swissport
- AeroCare
- DNATA
- ServisAir
- Worldwide Flight

Airports

- Miami Airport - 56
- San Diego Airport - 97
- Burbank Airport - 52
- Philadelphia Airport - 295
- LAX Airport - 247
- Albany Airport -12
- Seattle Airport - 552
- DFW Airport – 450
- Houston Airport - 820
- Hong Kong Airport - 176
- Chicago Airport – 194
- Austin Airport - 20



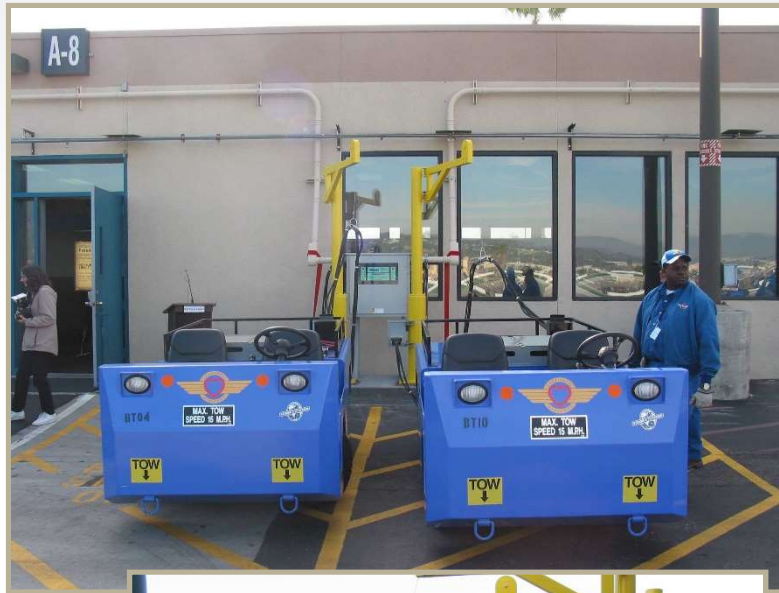
Airport Charging Infrastructure



Airport Charging Infrastructure



Airport Partnerships



AV
aerovironment



Integrated OEM Charging Solution

GSE OEM's have discovered that fast charging helps them sell more electric vehicles

Most OEMs provides "Fast Charge Kit" From the factory:

- Integrates the BMID into their Wiring harness
- Provides external charging port for Battery Charging
- Interlocks with vehicle drive system
- Lowest cost solution



AV
aerovironment

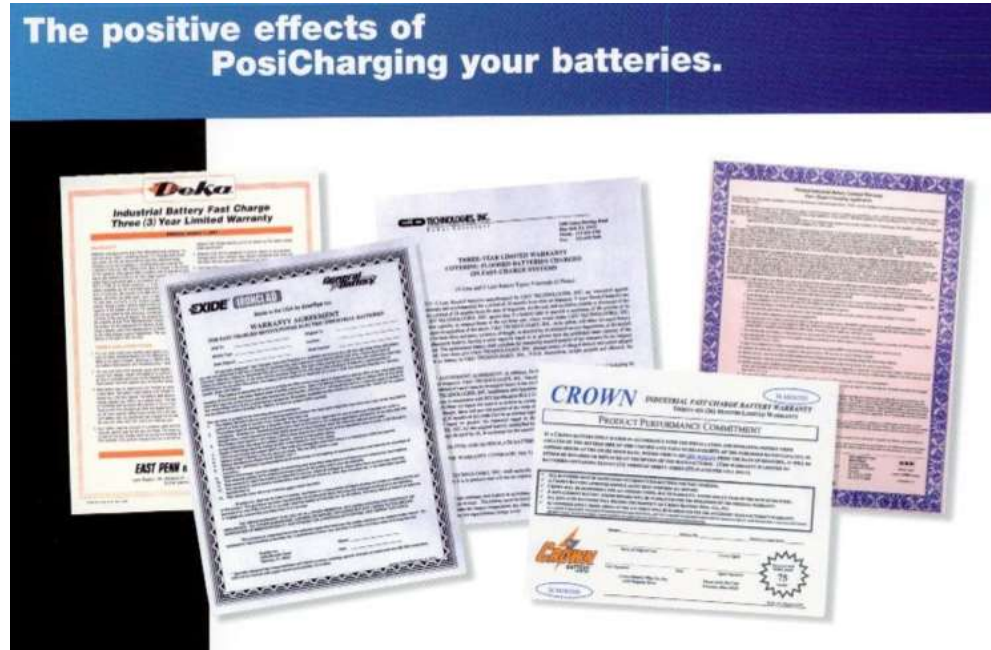


PosiCHARGE™
AeroVironment®

Charge All Major Battery Brands

Battery Warranties:

- GNB/Exide
- EnerSys
- Deka
- Douglas
- Hawker
- Crown
- BBI



Now available to charge Lithium Batteries

Battery Rx

Your Solution for Fleet Battery Health

Take Charge of Your Batteries with **BATTERY RX™**



- 1** EASY SETUP
Installs in 20 minutes with no special battery requirements.
- 2** 24/7 BATTERY MONITORING
Monitors battery SOC, water level, voltage and temperature in real-time.
- 3** SMART CHARGING CAPABILITY
Transforms your facility into a "smart fleet" operation.

- 4** WARRANTY COMPLIANCE TRACKING
- Stores cumulative battery data for the life of the battery.
- Provides complete warranty history and helps you comply with your battery warranty – no more finger pointing.
- 5** CELLULAR COMMUNICATIONS
- Delivers actionable data without IT department's involvement.
- Alerts sent directly to email.



Battery Rx

Your Solution for Fleet Battery Health

Key Capabilities

1. Stores Unique Battery Profile & Specific Charge and EQ Requirements
 - Makes the Charger UNIVERSAL (Multi-Voltage, Multi-Ah, Multi-Chemistry and Multi-Manufacturer)
2. Monitors Battery Voltage & Temperature in real time
 - Precise charging independent of battery temperature or cable length
3. Stores Battery Cumulative Data
 - Provides complete warranty history (no finger pointing)
4. Monitors Battery 24/7
 - Measured battery terminal and half-pack voltages
 - Measures current using inter-cell connection
 - Water level detection
 - Electrolyte temperature measurement
5. Optional Cellular Modem
 - Connectivity to PosiNet Back Office
 - Email Alerts



Data Management Software...

- 22 Standard Reports
- View and download fleet info from the web



Battery ID	Vehicle ID	SOC	Total Plugs	Current Chg	Total Charge	Max Temp	Average Temp	Days in Charge
1	11000001	100	0	0.00	0	32.0	32.0	32.0
2	11000002	100	31	31.20	3.20	32.0	32.0	32.0
3	11000003	100	39	39.42	4.32	32.0	32.0	32.0
4	11000004	100	48	51.43	6.50	32.0	32.0	32.0
5	11000005	100	45	20.88	1.18	32.0	32.0	32.0
6	11000006	100	0	0.00	0	32.0	32.0	32.0
7	11000007	100	144	36.77	2.80	32.0	32.0	32.0
8	11000008	100	41	26.10	3.27	32.0	32.0	32.0
9	11000009	100	52	24.60	4.09	32.0	32.0	32.0
10	11000010	100	40	25.33	3.58	32.0	32.0	32.0
11	11000011	100	31	26.48	4.22	32.0	32.0	32.0
12	11000012	100	0	0.00	0	32.0	32.0	32.0
13	11000013	100	51	26.43	3.94	32.0	32.0	32.0
14	11000014	100	18	13.68	1.51	32.0	32.0	32.0
15	11000015	100	4	11.10	0.51	32.0	32.0	32.0
16	11000016	100	10	38.92	7.18	32.0	32.0	32.0
17	11000017	100	0	0.00	0	32.0	32.0	32.0
18	11000018	100	42	33.10	3.93	32.0	32.0	32.0

PosiNet Back Office Access

- Dedicated Web-site
- User only needs internet access. No IT intervention required
- Secure Access Control

AV
aerovironment

PosiCHARGE
AeroVironment

PosiNET Back Office

Welcome to the PosiNET Back Office

Please Login

Username:

Password:

☐ Remember Me

Login As Username:

[Forgot Username?](#) [Forgot Password?](#)

AV
aerovironment

© 2007-2016 by AeroVironment, Inc.. All rights reserved worldwide

version 3.0.0.1

PosiCHARGE
AeroVironment

PosiNet Fleet Management

Exception Report

Status

- Operations Status Report
- Battery Rx Alerts
- Battery Statistics
- Lifetime Battery History

Reports

- Battery History*
- Battery History Logs*
- Charge Logs
- Charge Summary
- Configuration Logs*
- Configuration Summary
- Daily Battery Performance
- Equalization Logs

Battery Warranty

- By Ahrs Throughput
- By Time (Months)

Charts

- Battery SOC and Schedule
- Battery SOC Over Time
- Battery Temperature Over Time
- Daily Charge Report

My Account

- Account Profile
- Battery Rx Units
- BMID Test Page*
- Firmware Update Control Panel*
- E-Meter Log Report*
- Firmware History Report*
- SMS Events Report*

Settings

- Battery Rx Configuration

Users

- User Maintenance
- Organization Definitions*
- Division Definitions

Operations Status Report

[Export as Excel](#)
[Export as CSV](#)
[Grid Column Chooser](#)
☒ Ignore In Service Date and Invalid Date Filters

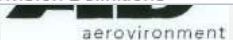

Organization: Kraft
 Division: Brampton
 Location: Brampton-Hopewell
 Building: (any)

Weekly Start/End: Tuesday to Monday
 Date of Week: 10/27/2013
 Refresh
 Send Report On Tuesday

Search Fields: (none)
 Refresh
 Reset Search Criteria

Date Range: 10/22/2013 up to 10/28/2013

	Battery ID	Vehicle ID	Batt Capacity	EQ Complete	SOC < 20%	Total Plugins	Cumul Chg Time (Hours)	Total Charge Ahrs	Tot Disch Ahrs	Max Temp Exceeded	Average Temp	Days High Temp Evts
1	00001214	00001214	1,000	●	●	41	20.57	4,822	4,572	●	102.2	0
2	00001217	00001217	1,000	●	●	38	46.43	6,934	5,599	●	122.0	2
3	00003098	00000313	750	●	●	33	14.72	1,628	1,521	●	73.4	0
4	OGAP0239	00001208	1,000	●	●	36	25.38	5,479	5,271	●	107.6	0
5	OGAP0316	00001211	1,000	●	●	23	18.53	3,497	3,445	●	91.4	0
6	OGAP0318	00001210	1,000	●	●	40	47.43	6,219	4,602	●	120.2	1
7	OGAP0319	00001222	1,000	●	●	37	28.18	5,626	5,126	●	102.2	0
8	OGAP0320	00001212	1,000	●	●	28	22.70	4,440	4,208	●	102.2	0
9	OGAP0321	00001203	1,000	●	●	35	29.28	5,551	5,039	●	111.2	0
10	OGAP0322	00001221	1,000	●	●	40	36.90	6,339	5,688	●	116.6	1
11	OGAP0323	00001209	1,000	●	●	41	30.32	7,041	6,894	●	109.4	0
12	OGAP0324	00001201	1,000	●	●	37	30.15	5,741	5,668	●	104.0	0
13	OGAP0325	00001204	1,000	●	●	38	24.68	5,705	5,322	●	102.2	0
14	OGAP0326	00001223	1,000	●	●	44	34.92	6,224	5,191	●	111.2	0
15	OGAP0327	00001207	1,000	●	●	43	28.15	6,466	6,205	●	111.2	0
16	OGAP0336	00001206	1,000	●	●	3	8.50	1,404	716	●	84.2	0
17	OGAP0497	00001213	1,000	●	●	38	27.50	5,412	5,003	●	109.4	0
18	OGAP0506	00001227	1,000	●	●	155	24.68	5,510	5,043	●	104.0	0
19	OGAP0509	00001224	1,000	●	●	42	38.33	6,151	5,060	●	113.0	1
20	OGAP0512	00001218	1,000	●	●	38	43.12	6,360	5,059	●	116.6	0
21	OGAP0514	00001202	1,000	●	●	41	52.85	8,304	7,328	●	123.8	2
22	OGAP0517	00001220	1,000	●	●	43	46.02	7,091	6,008	●	120.2	1
23	OGAP0518	00001205	1,000	●	●	44	42.35	6,715	5,559	●	127.4	1
24	OGAP0523	00001225	1,000	●	●	34	49.02	6,216	4,774	●	122.0	1
25	OGAP0528	00001219	1,000	●	●	121	30.72	5,912	5,237	●	111.2	1

PosiNet Fleet Management

Battery SOC

PosiNET Back Office

[Change Password](#) [Log Out](#)

Status

- Operations Status Report
- Battery Rx Alerts
- Battery Statistics
- Lifetime Battery History

Reports

- Charge Logs
- Charge Summary
- Configuration Summary
- Daily Battery Performance
- Equalization Logs

Battery Warranty

- By Ahrs Throughput
- By Time (Months)

Charts

- Battery SOC and Schedule
- Battery SOC Over Time
- Battery Temperature Over Time
- Daily Charge Report

My Account

- Account Profile
- Battery Rx Units

Settings

- Battery Rx Configuration

Users

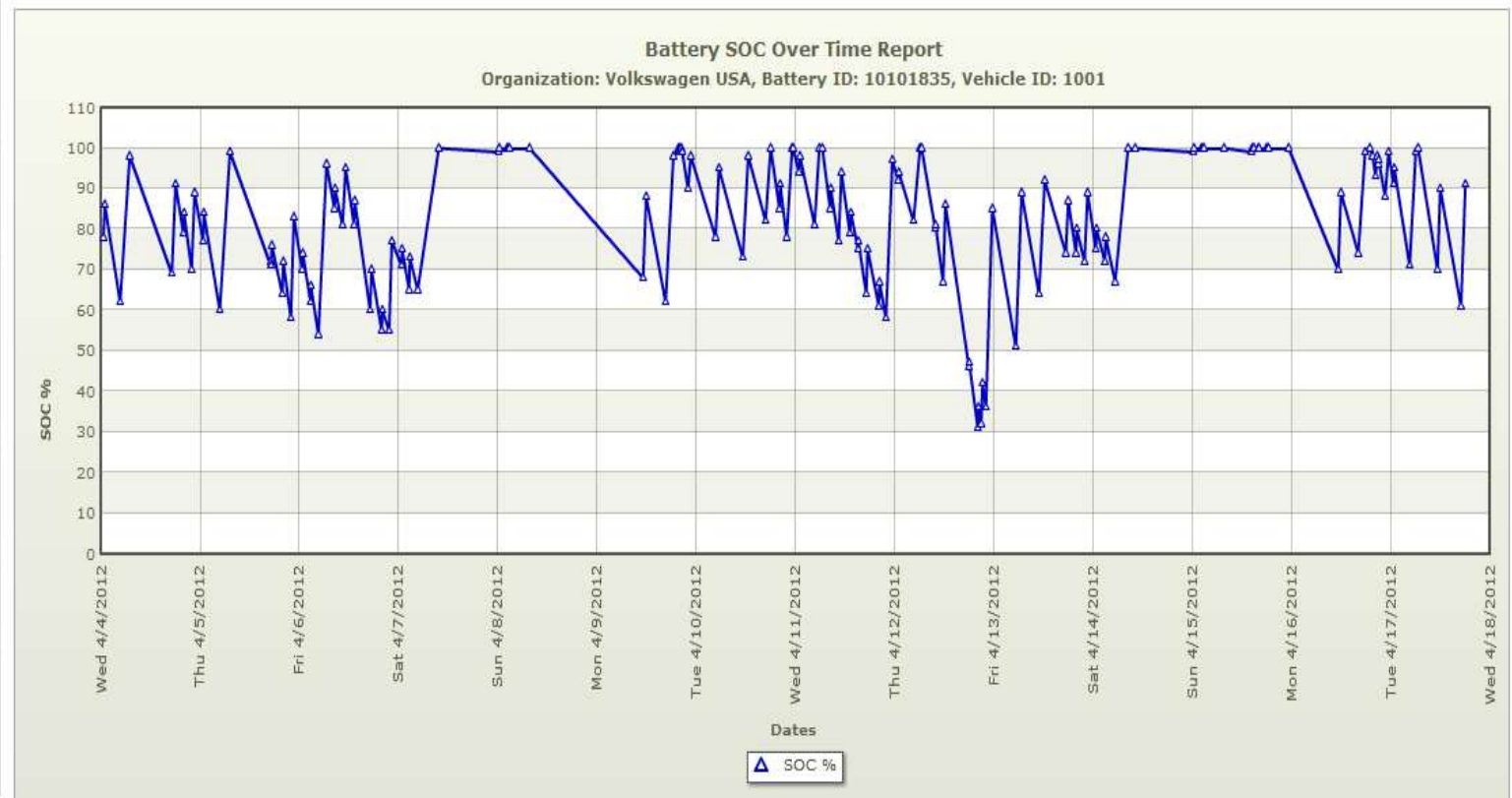
- User Maintenance
- Division Definitions
- Location Definitions
- Building Definitions

Battery SOC Over Time Report

Division: (any) Location: (any) Building: (any)

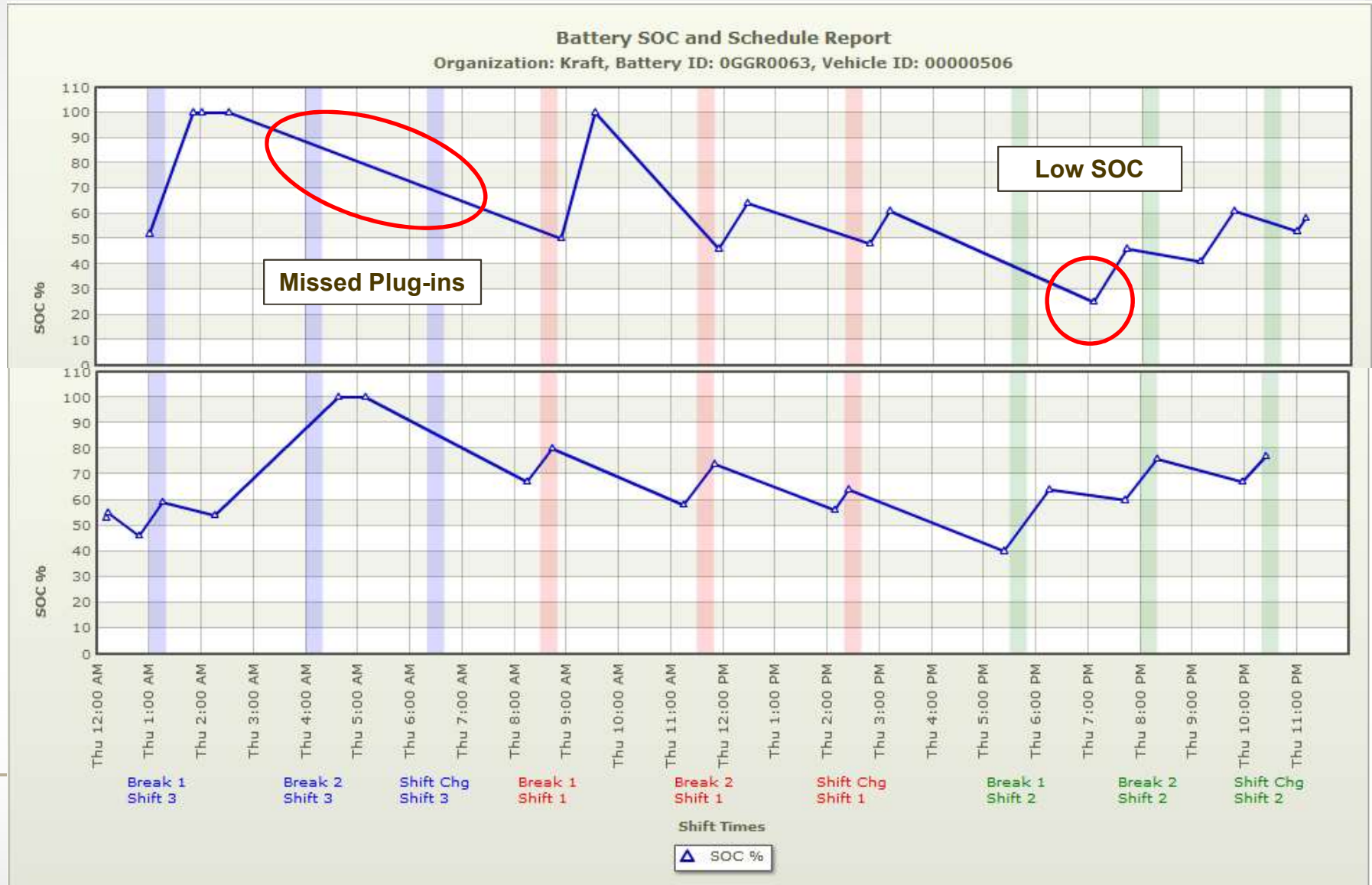
Battery ID: 10101835 Vehicle ID: 1001 Battery Rx SIM #: 89014103254032556221

From Date: 4/4/2012 To Date: 4/18/2012 Refresh Reset Date Criteria



PosiNet Fleet Management

Battery SOC vs Schedule



PosiNet Fleet Management

Battery Temperature

PosiNET Back Office

[Change Password](#) [Log Out](#)

Status

- Operations Status Report
- Battery Rx Alerts
- Battery Statistics
- Lifetime Battery History

Reports

- Charge Logs
- Charge Summary
- Configuration Summary
- Daily Battery Performance
- Equalization Logs

Battery Warranty

- By Ahrs Throughput
- By Time (Months)

Charts

- Battery SOC and Schedule
- Battery SOC Over Time
- Battery Temperature Over Time
- Daily Charge Report

My Account

- Account Profile
- Battery Rx Units

Settings

- Battery Rx Configuration

Users

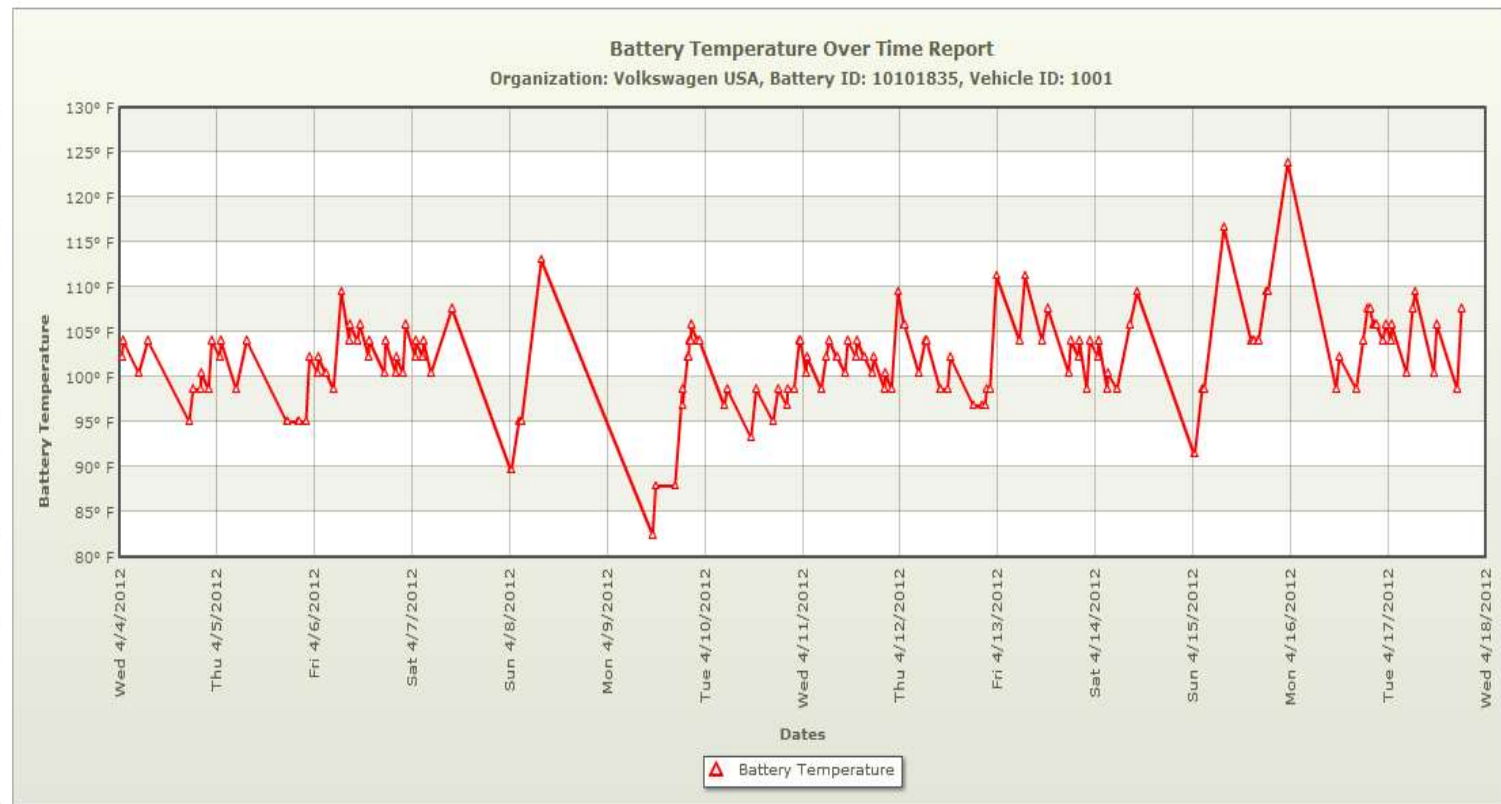
- User Maintenance
- Division Definitions
- Location Definitions
- Building Definitions

Battery Temperature Over Time Report

Division: (any) Location: (any) Building: (any)

Battery ID: 10101835 Vehicle ID: 1001 Battery Rx SIM #: 89014103254032556221 Min Scale Value: 80 ° F

From Date: 4/4/2012 To Date: 4/18/2012 Refresh Reset Date Criteria Y Axis (Temperature) Limit: 130 ° F



PosiNet Fleet Management

Battery Daily Charge Report

PosiNET Back Office

[Change Password](#) [Log Out](#)

Status

- Operations Status Report
- Battery Rx Alerts
- Battery Statistics
- Lifetime Battery History

Reports

- Charge Logs
- Charge Summary
- Configuration Summary
- Daily Battery Performance
- Equalization Logs

Battery Warranty

- By Ahrs Throughput
- By Time (Months)

Charts

- Battery SOC and Schedule
- Battery SOC Over Time
- Battery Temperature Over Time
- Daily Charge Report

My Account

- Account Profile
- Battery Rx Units

Settings

- Battery Rx Configuration

Users

- User Maintenance
- Division Definitions
- Location Definitions
- Building Definitions

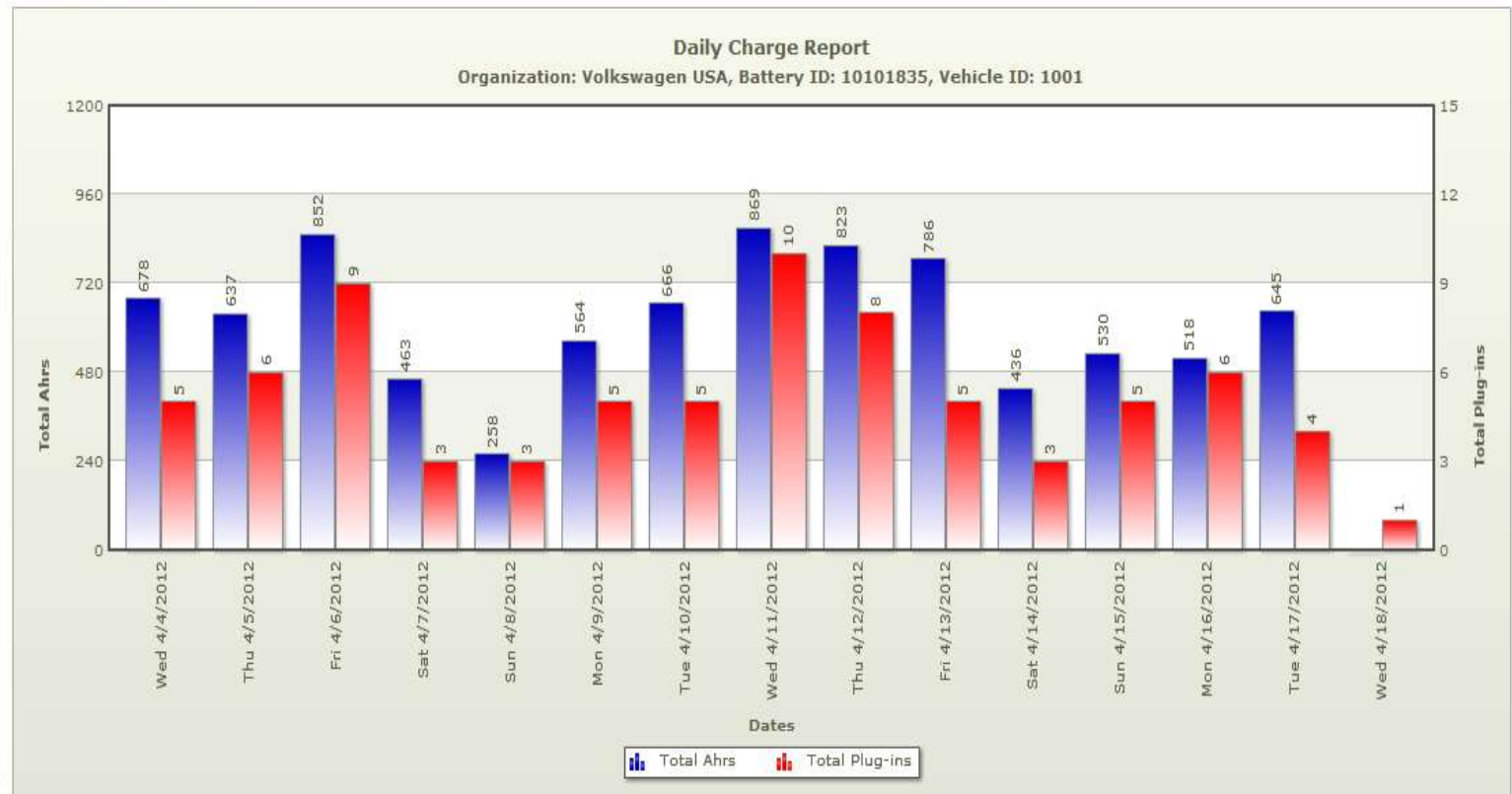
Daily Charge Report

Division: (any) Location: (any) Building: (any)

Battery ID: 10101835 Vehicle ID: 1001 Battery Rx SIM #: 89014103254032556221

From Date: 4/4/2012 To Date: 4/18/2012 Refresh Reset Date Criteria Y Axis Limits: Total Ahrs- 1200 Total Plug-ins- 15

Y Axis (Ahrs) Zoom: 1x



PosiNet Fleet Management

Battery Daily Performance

Menu items with an * are available to Super-Admin users only

Status

- Operations Status Report
- Battery Rx Alerts
- Battery Statistics
- Lifetime Battery History

Reports

- Battery History*
- Battery History Logs*
- Charge Logs
- Charge Summary
- Configuration Logs*
- Configuration Summary
- Daily Battery Performance
- Equalization Logs

Battery Warranty

- By Ahrs Throughput
- By Time (Months)

Charts

- Battery SOC and Schedule
- Battery SOC Over Time
- Battery Temperature Over Time
- Daily Charge Report

My Account

- Account Profile
- Battery Rx Units
- BMID Test Page*
- Firmware Update Control Panel*
- E-Meter Log Report*
- Firmware History Report*
- SMS Events Report*

Daily Battery Performance Report

☒ Export as Excel ☐ Export as CSV ☒ Ignore In Service Date and Invalid Date Filters

Organization: Nestle - Utah Division: Signal Strenght #1 Location: (any) Building: (any)

Battery ID: A40 Vehicle ID: 89 Battery Rx SIM #: (select)

From Date: 7/29/2013 To Date: 8/4/2013 Refresh Reset Date Criteria

	Vehicle ID	Date	Posi Charge Ahrs	Disch Ahrs	Posi Fast Chg Hours	Posi EQ Hours	Run Hours	Full Chg Comp	EQ Comp	Min Batt SOC	Max Batt Temp	Low Wat Today
1	89	7/29/2013 12:00 AM	904	1,074	4.17	0.00	10.55	No	No	77	107.6	No
2	89	7/30/2013 12:00 AM	1,212	1,052	5.43	0.00	10.37	Yes	No	80	107.6	No
3	89	7/31/2013 12:00 AM	1,342	1,293	5.60	0.00	11.25	Yes	No	63	111.2	No
4	89	8/1/2013 12:00 AM	1,350	1,334	5.07	0.00	12.83	Yes	No	58	113.0	No
5	89	8/2/2013 12:00 AM	1,538	1,606	5.23	0.00	15.18	Yes	No	54	116.6	No
6	89	8/3/2013 12:00 AM	1,323	1,369	5.58	0.00	14.17	Yes	No	69	113.0	No
7	89	8/4/2013 12:00 AM	631	86	1.78	8.07	0.63	No	Yes	75	114.8	No

PosiNet Fleet Management

Battery Statistics

Status

- Operations Status Report
- Battery Rx Alerts
- Battery Statistics
- Lifetime Battery History

Reports

- Battery History*
- Battery History Logs*
- Charge Logs
- Charge Summary
- Configuration Logs*
- Configuration Summary
- Daily Battery Performance
- Equalization Logs

Battery Warranty

- By Ahrs Throughput
- By Time (Months)

Charts

- Battery SOC and Schedule
- Battery SOC Over Time
- Battery Temperature Over Time
- Daily Charge Report

My Account

- Account Profile
- Battery Rx Units
- Battery RX Test Page*
- Firmware Update Control Panel*
- E-Meter Log Report*
- Firmware History Report*
- SMS Events Report*

Settings

- Battery Rx Configuration

Users

- User Maintenance
- Organization Definitions*
- Division Definitions
- Location Definitions
- Building Definitions
- Shift Schedules

Battery Statistics

[Export to PDF](#)

Organization: Division: Location:

Battery ID: Vehicle ID:

Search Fields:

Battery

Battery ID: OGGR0069
 Vehicle ID: 00000507
 BATTERY MFG Serial Number: (not entered)
 Firmware Revision: 00.00.09.15
 Initialization Date: 2/4/2013 2:26 PM
 Days in Operation: 632
 Data as Of: 4/6/2015 11:59 PM

Voltage

Number Low Voltage Events: 373
 Number High Voltage Events: 0
 Min Recorded Voltage: 44.9 V
 Max Recorded Voltage: 63.9 V
 Nominal Battery Voltage: 48 V

Temperature

Days High Temperature Events: 5
 Min Recorded Temperature: 64.4°
 Max Battery Temperature: 141.8°

Charge

Total Charge Events: 5,357
 Cumulative Amp-hours Charged: 552,969 Ahrs
 Cumulative Kilowatt-hours Charged: 31,976 KWhrs
 Total SOC events below 20%: 621

Discharge

Cumulative Discharge Amp-hours: 520,211 Ahrs
 Cumulative Discharge KWhrs: 24,669 KWhrs

Battery Life / Capacity

Remaining Battery Life (based on warranty): 22 month(s)
 Remaining Battery Life (based on Amp-hours): 565,212 Ahrs
 Rated Battery Capacity: 850 Ahrs
 Estimated Battery Capacity: TBD

Equalization

Total Equalization hours: 744
 Total Complete Equalization events: 81
 Days since last Complete Equalization: 1
 Max Rec Days between Equalizations: 6 days
 Max Rec Amp-hours between Equalizations: 7,306 Ahrs
 Last Complete EQ Date: 4/5/2015 5:30 AM

Run Time / Key Time

Cumulative Run Time: 5,448 hr
 Cumulative Key-On Time: 6,275 hr
 Cumulative Key-Off Time: 8,856 hr
 Cumulative Charge Time: 3,803 hr
 Cumulative Idle Time: 5,917 hr

Water

Number of Days with Low Water: 422

PosiNet Fleet Management

Battery Warranty – Ah Throughput

Status

- Operations Status Report
- Battery Rx Alerts
- Battery Statistics
- Lifetime Battery History

Reports

- Battery History*
- Battery History Logs*
- Charge Logs
- Charge Summary
- Configuration Logs*
- Configuration Summary
- Daily Battery Performance
- Equalization Logs

Battery Warranty

- By Ahrs Throughput
- By Time (Months)

Charts

- Battery SOC and Schedule
- Battery SOC Over Time
- Battery Temperature Over Time
- Daily Charge Report

My Account

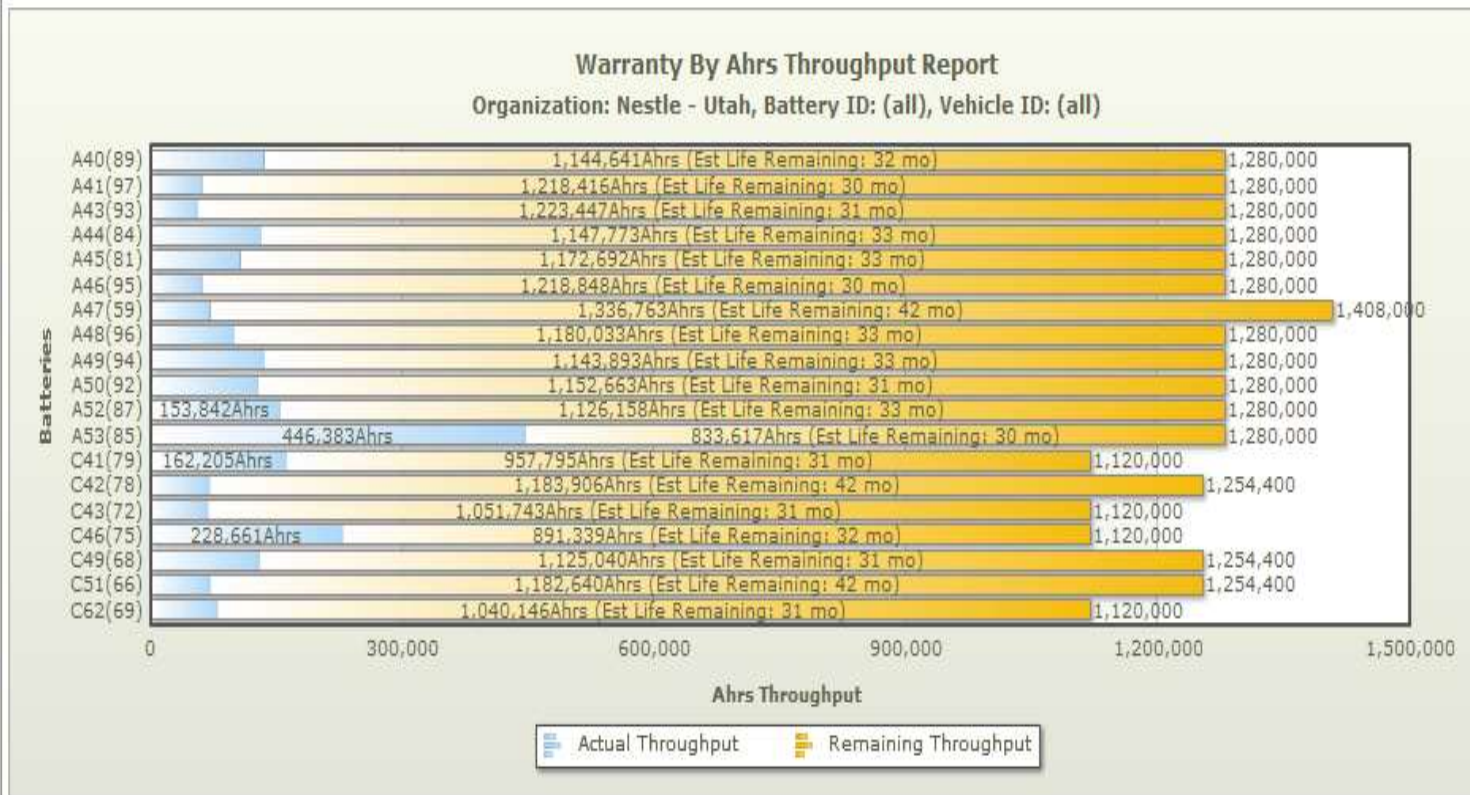
- Account Profile
- Battery Rx Units
- BMD Test Page*

Warranty By Ahrs Throughput Report

 [Export as Excel](#)

Organization: Nestle - Utah Division: Signal Strenght #1 Location: (any) Building: (any)

Battery ID: (all) Vehicle ID: (all) Battery Rx SIM #: (all)



PosiNet Fleet Management

Battery Tracker Configuration

Status

- Operations Status Report
- Battery Rx Alerts
- Battery Statistics
- Lifetime Battery History

Reports

- Charge Logs
- Charge Summary
- Configuration Summary
- Daily Battery Performance
- Equalization Logs

Battery Warranty

- By Ahrs Throughput
- By Time (Months)

Charts

- Battery SOC and Schedule
- Battery SOC Over Time
- Battery Temperature Over Time
- Daily Charge Report

My Account

- Account Profile
- Battery Rx Units

Settings

Battery Rx Configuration

Users

- User Maintenance
- Division Definitions
- Location Definitions
- Building Definitions

Battery Rx Configuration

Division: (any) Location: (any) Building: (any)

Battery ID: 10101835 Vehicle ID: 1001 Battery Rx SIM #: 89014103254032556221

Get Latest Config New Config

Search Fields: (none) Refresh Reset Search Criteria

Parameters

Battery Rx Serial Number	Start Current Limit: 40 A/100Ahr	Temp Foldback: 1.5 A°C/100Ahr
Battery Rx SIM #: 89014103254032556221	SOC Limit: 100 %	Internal Resistance: 120 mOhms
Software Version: 00.00.08.35	EQ Start Day/Time: Sun 0 15	Parasitic Current: 250 mA
Timestamp: 1/7/2012 12:24:00 AM	EQ End Day/Time: Sun 23 45	Key On Detect: Curr Sense
Vehicle ID: 1001	Max Ahr Btw EQ: 2,500 Ahr	Key On Logic: Positive
Battery ID: 10101835	Max Days Btw Any EQ: 6 Days	Key on Current: 500 mA
Battery Type: Hawker Flat Plate Flooded	GMT Timezone Offset: Eastern Standard Time <input checked="" type="checkbox"/> Adjust for Daylight Savings	Run Time Current: 2,000 mA
Batt Total Cells: 24	Daily Call Time (24 hr): 0 : 10	
Battery Capacity: 765 Ahr	Target Limit (mV/Cell): 3,000	

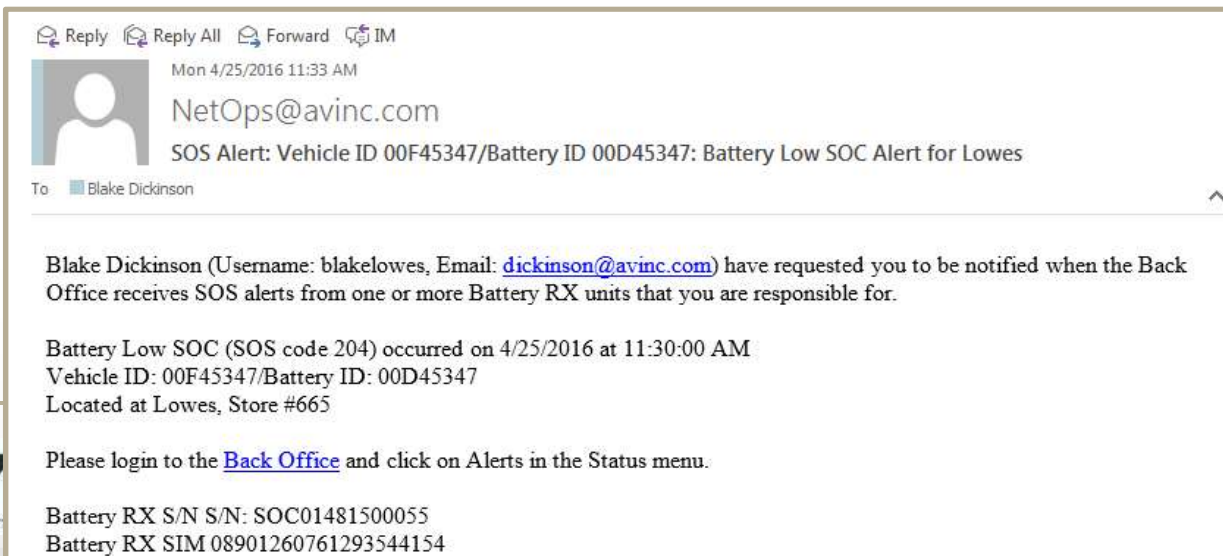
Alert Settings

Low SOC Limit: 20 %	Max Charge Current Limit: 60 Amp/Ahr
Hi/Lo Limit (mV/Cell): 3,000 / 1,667	Max Days Since Cmpl EQ: 14 Days
Pack Voltage Imbal Limit: 100 mV/Cell	EQ Current Range: 20 % +/-

PosiNet Back Office

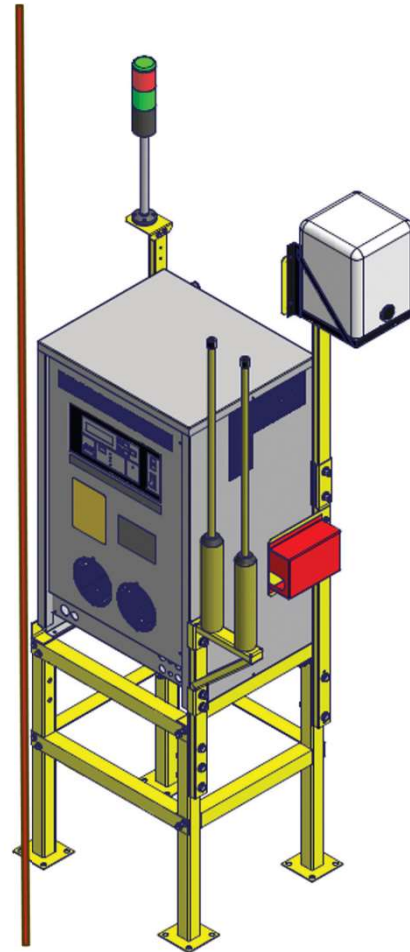
Automatic E-mail Alerts

- **PosiNet Back Office will automatically send email alerts to selected individuals should a particular alert occur**
- **Alerts are chosen by the customer and include but not limited to:**
 - High Battery Temperature, Low Battery Water, Low Battery State of Charge
 - Missed Plug-ins, Missed Equalize Charges
- **Stay ahead of the curve instead of in the curve**
 - Address battery/charger issues as they come up
 - Do not wait until battery run time issues become a problem
 - Use the Back Office data to even out usage across the entire fleet



Automatic Battery Watering

- Adds water to battery at the optimal time during EQ so that the battery gets the benefit of mixing the electrolyte during EQ
- Removes the “human factor” from battery watering as long as the connection is made the battery will get water
- Reduces maintenance costs
- Ensures battery warranty parameters are being met



Automatic
Battery Watering



Easy to connect

Distributed Charging System

Multi-Vehicle Systems:

- One utility connection can charge up to 10 Vehicles Simultaneously.
- Integrated Software manages the charge with priority given to the battery with lowest State of Charge
- Reduces Infrastructure requirements and Installation cost
- Provides a flexible solution for the Airport Environment.
- Robust and proven technology
- Over 3000 Charging locations at Airports using MVS technology



Sub-Zero Applications

- PosiCharge is the only GSE Charger rated for OUTDOOR use in Sub-Zero applications.
- All other “outdoor rated” GSE chargers have to be installed in a climate controlled environment
- All other “BID Modules” do not work below freezing which prevents the charger from charging below zero



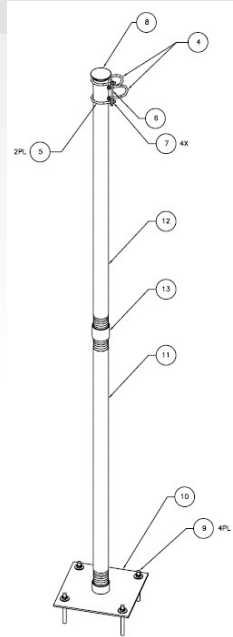
Integrated Power Sharing

- PosiCharge developed this technology in cooperation with EPRI and Delta Air Lines in 2004
- PosiCharge integrates the Power Sharing function into the intelligence of the charger.
- NO additional “interface box” required, no additional point of failure
- Because it is done intelligently, PosiCharge can share power with any electrical equipment (Jet Bridge, PCA, 400Hz)



Cable Management Options

- Fixed Pole
- Pole with Pogo



Cable Management Options

- Cable Trolley
- Custom



PosiCharge Partnership Advantage

- Wealth of Experience in the GSE Market Worldwide
- Over 3,500 charger operating in airports around the world
- 17 years of of Historical knowledge and data on Airport Operations
- 90%+ of the world market share in GSE Fast Chargers