ATTACHMENT A

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

RFP 12-16

UPS AND DC POWER SYSTEMS

SCHEDULED MAINTENANCE AND SERVICES

SITE LOCATIONS & EQUIPMENT

ATTACHMENT (A) ***HILLSBOROUGH COUNTY SHERIFF'S OFFICE***

Battery Charger and UPS Systems

Site Name	Address	UPS System	UPS Rating	UPS Model No.	Battery Charger	Charger Model No.	Panel Model No.	Batteries
78th Street Site	3212 S. 78th Street Tampa, FL 33619	Toshiba 4400 Series	50 KVA	4400F3F500XA	Toshiba External Battery Cabinet	441B500032 ER111	MBSWH-500-F3-KK	12HX540-FR
BullFrog Creek	13010 Bullfrog Creek Road Gibsonton, FL 33569	Toshiba 1400 XL Plus Series	18KVA	UC3G2L180C6	PCP Mini Power Systems	MPR-1-48	MPS-1L	GNB M12V70
Taylor Road	West Side of Taylor Rd Landfill 6209 County Road 579 Seffner, FL 33584	Toshiba 1400 XL Plus Series	22 KVA	UE3G2L220C61T BAT CABINET UE3-BC-060060 QTY (2)	PCP Charger -48 VDC QTY (2) Pre-TwinPack2	HFE-48-25B	PB-48/25	GNB M12V70
Pinecrest	Southeast Fire Station #2 6766 Lithia Pinecrest Road Lithia, FL 33547	Toshiba 4000 Series	20 KVA	TM4-D620D634	PCP TwinPack2 -48VDC	7004821021	9RE435ACDAAO	GNB 50A-07 160 AH
Plant City	Highway Maintenance Unit #4 4702 Sydney Road Plant City, FL 33566	Toshiba 1400 XL Plus Series	18KVA	UC3G2L180C6	PCP Mini Power Systems	MPR-1-48	MPS-1L	GNB M12V70
Wimauma	Wimauma Fire Station #22 1120 7th Street Wimauma, FL 33598	Toshiba 4000 Series	20 KVA	TM4-D620D634	PCP TwinPack2 -48VDC	7004821021	9RE435ACDAAO	GNB 50A-07 160 AH
Himes Avenue	2001 N. Himes Avenue Tampa, FL 33607	Toshiba 1600 XP	22 KVA	UH3G2L220C61T	C & D Technologies	SM1X48		TEL 12-90BST

ATTACHMENT (A) ***HILLSBOROUGH COUNTY SHERIFF'S OFFICE***

Battery Charger and UPS Systems

Site Name	Address	UPS System	UPS Rating	UPS Model No.	Battery Charger	Charger Model No.	Panel Model No.	Batteries
EDOC	Emergency Dispatch Operations Center 2709 E. Hanna Ave. Tampa, FL 33610	Toshiba 4400 Series	50 KVA	4400F3F500XA	Toshiba External Battery Cabinet	441B500032 ER111	MBSWH-500-F3-KK	12HX540-FR
EDOC (Backup Radio)	Emergency Dispatch Operations Center 2709 E. Hanna Ave. Tampa, FL 33610				PCP TwinPack2 +12 VDC	TWI-12N		
D4 HQ - District IV Headquarters	508 33rd St. SE Ruskin, FL 33570	Toshiba 1400 Series	18 KVA	UC3G2L180C6	PCP TwinPack2 -48VDC	7004821021	9RE435ACDAAO	GNB 50A-07 160 AH
Hurrah	East of SR 39 Thatcher Park 111 Alafia Church Road Lithia, FL 33547	Toshiba 1400 Series	2.4 KVA	TM4-D620D634	PCP TwinPack2 -48VDC	7004821021	9RE435ACDAAO	GNB 50A-07 160 AH
Tampa General Hospital (TGH)	10th Floor New Bldg. Air Conditioning Unit # 1 Davis Island, FL 33601	Toshiba 1400 XL Plus Series	18KVA	UC3G2L180C6	PCP Mini Power Systems	MPR-1-48	MPS-1L	GNB M12V70
Gunn Highway	Gunn Highway Fire Station # 13 7502 Gunn Highway Tampa, FL 33625	Toshiba 4000 Series	20 KVA	TM4-D620D634	PCP TwinPack2 -48VDC	7004821021	9RE435ACDAAO	GNB 50A-07 160 AH
Fire Station 10	Fire Station #10 8430 N. Grady Ave. Tampa, FL 33614	Toshiba 1400 XL Plus Series	18KVA	UC3G2L180C6 WITH QTY (1) BATTERY CABINET	PCP Mini Power Systems	MPR-1-48	MPS-1L	GNB M12V70

ATTACHMENT (A) ***HILLSBOROUGH COUNTY SHERIFF'S OFFICE***

Battery Charger and UPS Systems

Site Name	Address	UPS System	UPS Rating	UPS Model No.	Battery Charger	Charger Model No.	Panel Model No.	Batteries
Fire Station 20	City of Tampa Fire Station #20 16200 Bruce B. Downs Blvd. Tampa, FL 33647	Toshiba 4400 Series	25 KVA	4400F3F250XA	Toshiba External Battery Cabinet	441B250065 ER111	MBSWH-250-F3-KK	12HX505-FR
Cork Knight	Cork Knight Fire Station #26 5302 W. Thonotosassa Rd. Plant City, FL 33565	Toshiba 4000 Series	20 KVA	TM4-D620D634	PCP TwinPack2 -48VDC	7004821021	9RE435ACDAAO	GNB 50A-07 160 AH
SOC - Sheriff's Operation Center	2008 E. 8th Avenue Tampa, FL 33601	Toshiba 4400 Series	50 KVA	4400F3F500XA	Toshiba External Battery Cabinet	441B500032 ER111	MBSWH-500-F3-KK	12HX540-FR
SOC - Sheriff's Operation Center (Backup Radio)	2008 E. 8th Avenue Tampa, FL 33601				NEWMAR +12 VDC	PM-12-70 QTY (5)	PFM400 POWER MANAGER	AVR100-ET QTY (3)
ORJ 18 KVA - Orient Road Jail	1201 Orient Road Tampa, FL 33619	Toshiba 1600 Series	18 KVA	UC3G2L180C6 QTY (1)				
ORJ 1.5 KVA - Orient Road Jail	1201 Orient Road Tampa, FL 33619	Toshiba 1000 Series	1.5 KVA	UT1A1A015C6 QTY (3)				
ORJ 1.0 KVA - Orient Road Jail	1201 Orient Road Tampa, FL 33619	Toshiba 1000 Series	1.0 KVA	UT1A1A010C6 QTY (4)				

ATTACHMENT (A) ***HILLSBOROUGH COUNTY SHERIFF'S OFFICE***

Battery Charger and UPS Systems

Site Name	Address	UPS System	UPS Rating	UPS Model No.	Battery Charger	Charger Model No.	Panel Model No.	Batteries
Video Downlink	2502 N. Falkenburg Road Tampa, FL 33619	Toshiba 1000 Series	1.5 KVA	UT1A1A015C6 QTY (1)				
Radio Shop	HCSO Radio Shop 2214 N. Falkenburg Road Tampa, FL 33619	Toshiba 1000 Series	1.5 KVA	UT1A1A015C6 QTY (1)				
Spare	HCSO Radio Shop 2214 N. Falkenburg Road Tampa, FL 33619	Toshiba 1400 Series	2.4 KVA	TM4-D620D634				
Temple Terrace - Fire Station 1	124 Bullard Pkwy Temple Terrace, FL 33617	Toshiba 1600 XP	14 KVA	UH3G2L140C61T				GNB M12V155FT

ATTACHMENT B

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

RFP 12-16

UPS AND DC POWER SYSTEMS

SCHEDULED MAINTENANCE AND SERVICES

UPS SYSTEMS TEST DATA FORMS

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

TOSHIBA UPS

CHECKS AND TEST DATA

SITE NAME: _____ **S.O. No.** _____
DATE: _____ **RACK No.** _____
TECHNICIAN: _____

UPS SYSTEM
MANUFACTURER: _____ **MODEL No.** _____
SERIES: _____ **SERIAL No.** _____
RATING: _____ **PHASES:** _____

(Included, but not limited to the following:)

DESCRIPTION OF UPS CHECKS	UPS CHECKS	REMARKS & RECOMMENDATIONS
Battery Visual Checks (Y= no case distortion)		
Battery Leakage Checks (Y= put battery location in remarks)		
Battery Corrosion Check & Cleaning (Y=ok or cleaned)		
Record System Float Charging Voltage		
Record Individual Units Float Charging Voltage		
Record Battery String for Trending Over Time		
Battery String Voltage @ 10 minutes		
Battery String Voltage @ 20 minutes		
Battery String Voltage @ 30 minutes		
Battery String Voltage @ 60 minutes		
Re-Torque All Inter-Battery Connecting Hardware		
Re-Torque All Power Connections		
Check Input AC Voltage (Volts)		
Check and Set Output AC Voltage (Volts)		
Check Internal Bypass Switch Operation		
Check External Bypass Switch Operation		
Check All External Alarm Outputs		
Check ALL Internal Alarm Functions		
Check All Display Readings		
Inspect Power fuses		
Inspect Battery string fuses		
Inspect input/output circuit breakers		
Inspect inverter fuses		
Clean inside and outside of UPS Systems		
Inspect Cooling Fans		
Monitor Cooling Fan bearing noise and vibration		
Inspect All Aluminum Electrolytic Capacitors for leakage		

TEST EQUIPMENT:
MODEL No: _____ **SERIAL No.** _____
MODEL No: _____ **SERIAL No.** _____

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

TOSHIBA UPS

BATTERY PLOT DATA - 3 PHASE

SITE NAME: _____ **S.O. No:** _____
DATE: _____ **RACK No:** _____
TECHNICIAN: _____

UPS SYSTEM
MANUFACURER: _____
SERIES: _____ **MODEL No.:** _____
RATING: _____ **SERIAL No:** _____
PHASES: _____

Voltage After	
1 Min	
2 Min	
3 Min	
4 Min	
5 Min	
6 Min	
7 Min	
8 Min	
9 Min	
10 Min	
11 Min	
12 Min	
13 Min	
14 Min	
15 Min	
16 Min	
17 Min	
18 Min	
19 Min	
20 Min	

Voltage After	
21 Min	
22 Min	
23 Min	
24 Min	
25 Min	
26 Min	
27 Min	
28 Min	
29 Min	
30 Min	
31 Min	
32 Min	
33 Min	
34 Min	
35 Min	
36 Min	
37 Min	
38 Min	
39 Min	
40 Min	

Voltage After	
41 Min	
42 Min	
43 Min	
44 Min	
45 Min	
46 Min	
47 Min	
48 Min	
49 Min	
50 Min	
51 Min	
52 Min	
53 Min	
54 Min	
55 Min	
56 Min	
57 Min	
58 Min	
59 Min	
60 Min	

OUTPUT VOLTAGE	
A to N	V
B to N	V
C to N	V

LOAD AT TEST	
A	A
B	A
C	A

SYSTEM	
Float	V
Low Bat	V
Shutdown	V

TEST EQUIPMENT:
MODEL No: _____ **SERIAL No:** _____
MODEL No: _____ **SERIAL No:** _____

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

TOSHIBA UPS

BATTERY PLOT DATA - SINGLE PHASE

SITE NAME: _____ **S.O. No:** _____
DATE: _____ **RACK No:** _____
TECHNICIAN: _____

UPS SYSTEM
MANUFACURER: _____
SERIES: _____ **MODEL No.:** _____
RATING: _____ **SERIAL No:** _____
PHASES: _____

Voltage After	
1 Min	
2 Min	
3 Min	
4 Min	
5 Min	
6 Min	
7 Min	
8 Min	
9 Min	
10 Min	
11 Min	
12 Min	
13 Min	
14 Min	
15 Min	
16 Min	
17 Min	
18 Min	
19 Min	
20 Min	

Voltage After	
21 Min	
22 Min	
23 Min	
24 Min	
25 Min	
26 Min	
27 Min	
28 Min	
29 Min	
30 Min	
31 Min	
32 Min	
33 Min	
34 Min	
35 Min	
36 Min	
37 Min	
38 Min	
39 Min	
40 Min	

Voltage After	
41 Min	
42 Min	
43 Min	
44 Min	
45 Min	
46 Min	
47 Min	
48 Min	
49 Min	
50 Min	
51 Min	
52 Min	
53 Min	
54 Min	
55 Min	
56 Min	
57 Min	
58 Min	
59 Min	
60 Min	

OUTPUT VOLTAGE	
L1	V
L2	V

LOAD AT TEST	
L1	A
L2	A

SYSTEM	
Float	V
Low Bat	V
Shutdown	V

TEST EQUIPMENT:
MODEL No: _____ **SERIAL No:** _____
MODEL No: _____ **SERIAL No:** _____

ATTACHMENT C

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

RFP 12-16

UPS AND DC POWER SYSTEMS

SCHEDULED MAINTENANCE AND SERVICES

BATTERY TEST DATA FORMS

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

STATION BATTERY CHECKS

BATTERY TEST DATA

SITE NAME: _____ SO No. _____
DATE: _____ RACK No. _____
TECHNICIAN: _____

BATTERY SYSTEM:
MANUFACURER: _____ BATTERY TYPE _____
SERIES: _____ MODEL No. _____
RATING: _____ AMBIENT TEMP. _____

	BATTERY TEST DATA						
BATTERY	Inspection (1-5, 1 is "Excellent"	Voltage Float (Volts)	Voltage Equalize (Volts)	Ventilation (B)=Blocked	Visual Inspection (Y)= Casing Fine	Inter-Cell Link Torque	Remarks
Battery 1							
Battery 2							
Battery 3							
Battery 4							
Battery 5							
Battery 6							
Battery 7							
Battery 8							
Battery 9							
Battery 10							
Battery 11							
Battery 12							
Battery 13							
Battery 14							
Battery 15							
Battery 16							
Battery 17							
Battery 18							
Battery 19							
Battery 20							
Battery 21							
Battery 22							
Battery 23							
Battery 24							

TEST EQUIPMENT:
MODEL No. _____ SERIAL No. _____
MODEL No. _____ SERIAL No. _____

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

STATION BATTERY CHECKS

CHECKS AND TEST DATA

SITE NAME: _____ S.O. No. _____
DATE: _____ RACK No: _____
TECHNICIAN: _____

BATTERY SYSTEMS:
MANUFACTURER: _____ MODEL No: _____
SERIES: _____ SERIAL No: _____
RATING: _____

(Included, but not limited to the following:)

DESCRIPTION OF BATTERY CHECKS	BATTERY CHECKS	REMARKS & RECOMMENDATIONS
Total System Voltage @ Terminals		
Measure Voltage/Load @ Power Board Meter		
Measure Continuity of Trays or Racks to Ground		
Measure Voltage to Ground		
Measure Battery String Voltage		
Measure Ambient Temperature		
100% Visual Inspection of Cells (see GNB Bat Checklist)		
Measure Float Current		
Determine Load Sharing of Chargers		
Check Ventilation for Proper Operation		
Determine Actual Load Current		
Estimate Backup Time Based Upon Actual Load		
Verify Connector/Cable Sizing is Adequate for Actual Load		
100% Check for Corrosion on Connections and Links		
Clean Battery and Area		
Visually Inspect Cables and Wire Trays		
Check Fuses/Breakers		

TEST EQUIPMENT:
MODEL No: _____ SERIAL No. _____
MODEL No: _____ SERIAL No. _____

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

PCP BATTERY CHARGERS

CHECKS AND TEST DATA

SITE NAME: _____ **S.O. No.** _____
DATE: _____ **RACK No:** _____
TECHNICIAN: _____

BATTERY SYSTEMS:
MANUFACTURER: _____ **MODEL No:** _____
SERIES: _____ **SERIAL No:** _____
RATING: _____

(Included, but not limited to the following:)

DESCRIPTION OF CHARGER CHECKS	Y/N or Actual Reading	REMARKS & RECOMMENDATIONS
Charger 1		
Check all Digital Display Readouts		
Forced Paralleling (Y= functioning)		
Equalize Timer Setting (hours)		
Output Float Voltage Setting (Volts)		
Output Equalize Voltage Setting (Volts)		
High DC Voltage Shutdown Setting (Voltage)		
Check and Clean Fans		
Shut down AC breaker		
AC Failure Alarm (Y= ON)		
Battery Voltage Test		
Battery Voltage @10 min		
Battery Voltage @20 min		
Battery Votlage @30 min		
Battery Voltage @40 min		
Battery Votlage @60 min		
AC Breaker Switch ON		
Charger 2		
Check all Digital Display Readouts		
Forced Paralleling (Y= functioning)		
Equalize Timer Setting (hours)		
Output Float Voltage Setting (Volts)		
Output Equalize Voltage Setting (Volts)		
High DC Voltage Shutdown Setting (Voltage)		
Check and Clean Fans		
Shut down AC breaker		
AC Failure Alarm (Y= ON)		

DESCRIPTION OF CHARGER CHECKS	Y/N or Actual Reading	REMARKS & RECOMMENDATIONS
Battery Voltage Test		
Battery Voltage @10 min		
Battery Voltage @20 min		
Battery Votlage @30 min		
Battery Voltage @40 min		
Battery Votlage @60 min		
AC Breaker Switch ON		
Both Chargers		
Distribution Breaker Trip		
AC Failure Alarm functioning		
Low Voltage Disconnect Inspection		
Check and Torque all Connections		
Clean inside and outside of Chargers		
Check and Torque all Connections		

TEST EQUIPMENT:

MODEL No: _____ **SERIAL No.** _____

MODEL No: _____ **SERIAL No.** _____

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

STATION BATTERY CELLS & BANKS

UNDER FULL LOAD

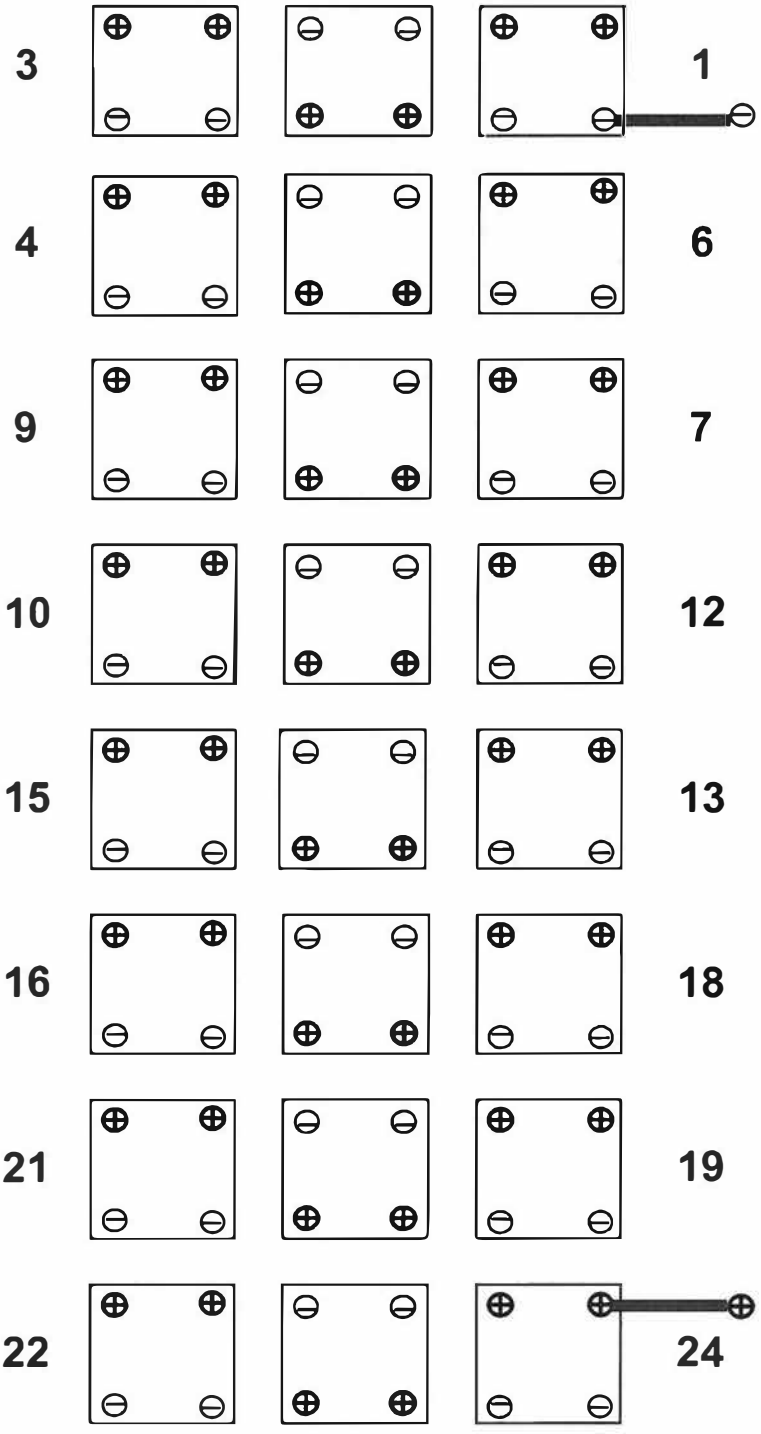
SITE NAME: _____
DATE: _____
TECHNICIAN: _____

CHARGER S.O. No. _____
RACK No: _____
BATTERY S.O. No. _____
RACK No: _____

BATTERY SYSTEMS:
MANUFACTURER: _____
SERIES: _____
RATING: _____

MODEL No: _____
SERIAL No: _____

BANK VOLTAGE	Volts
LOAD CURRENT	Amps



CELL NUMBER	VOLTS
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

STATION BATTERY CELLS & BANKS

UNDER FULL LOAD

SITE NAME: _____

DATE: _____

TECHNICIAN: _____

CHARGER S.O. No. _____

RACK No: _____

BATTERY S.O. No. _____

RACK No: _____

BATTERY SYSTEMS:

MANUFACTURER: _____

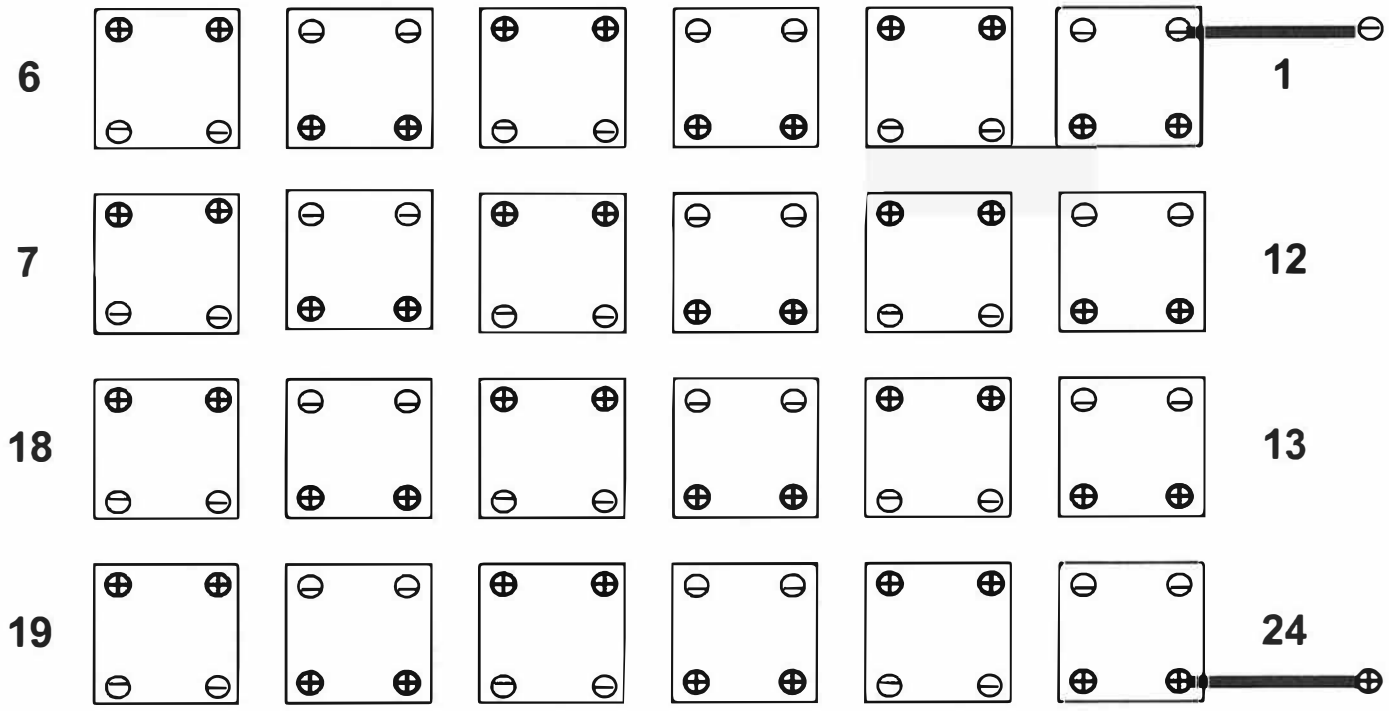
SERIES: _____

RATING: _____

MODEL No: _____

SERIAL No: _____

BANK VOLTAGE	Volts
LOAD CURRENT	Amps



CELL NUMBER	VOLTS
1	
2	
3	
4	
5	
6	
7	
8	

CELL NUMBER	VOLTS
9	
10	
11	
12	
13	
14	
15	
16	

CELL NUMBER	VOLTS
17	
18	
19	
20	
21	
22	
23	
24	

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

STATION BATTERY CELLS & BANKS

FLOAT VOLTAGE

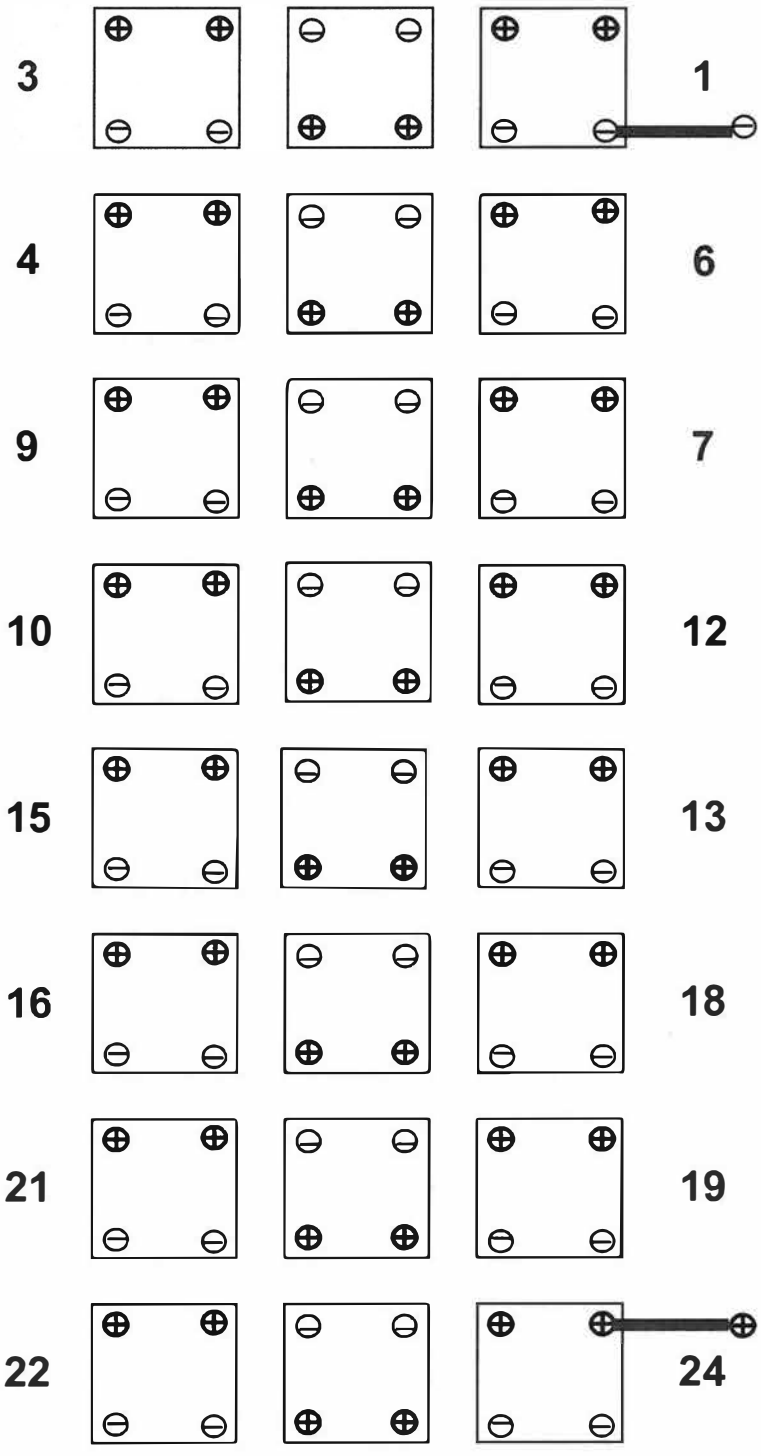
SITE NAME: _____
DATE: _____
TECHNICIAN: _____

CHARGER S.O. No. _____
RACK No: _____
BATTERY S.O. No. _____
RACK No: _____

BATTERY SYSTEMS:
MANUFACTURER: _____
SERIES: _____
RATING: _____

MODEL No: _____
SERIAL No: _____

BANK VOLTAGE	Volts
LOAD CURRENT	Amps



CELL NUMBER	VOLTS
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

STATION BATTERY CELLS & BANKS

FLOAT VOLTAGE

SITE NAME: _____

DATE: _____

TECHNICIAN: _____

CHARGER S.O. No. _____

RACK No: _____

BATTERY S.O. No. _____

RACK No: _____

BATTERY SYSTEMS:

MANUFACTURER: _____

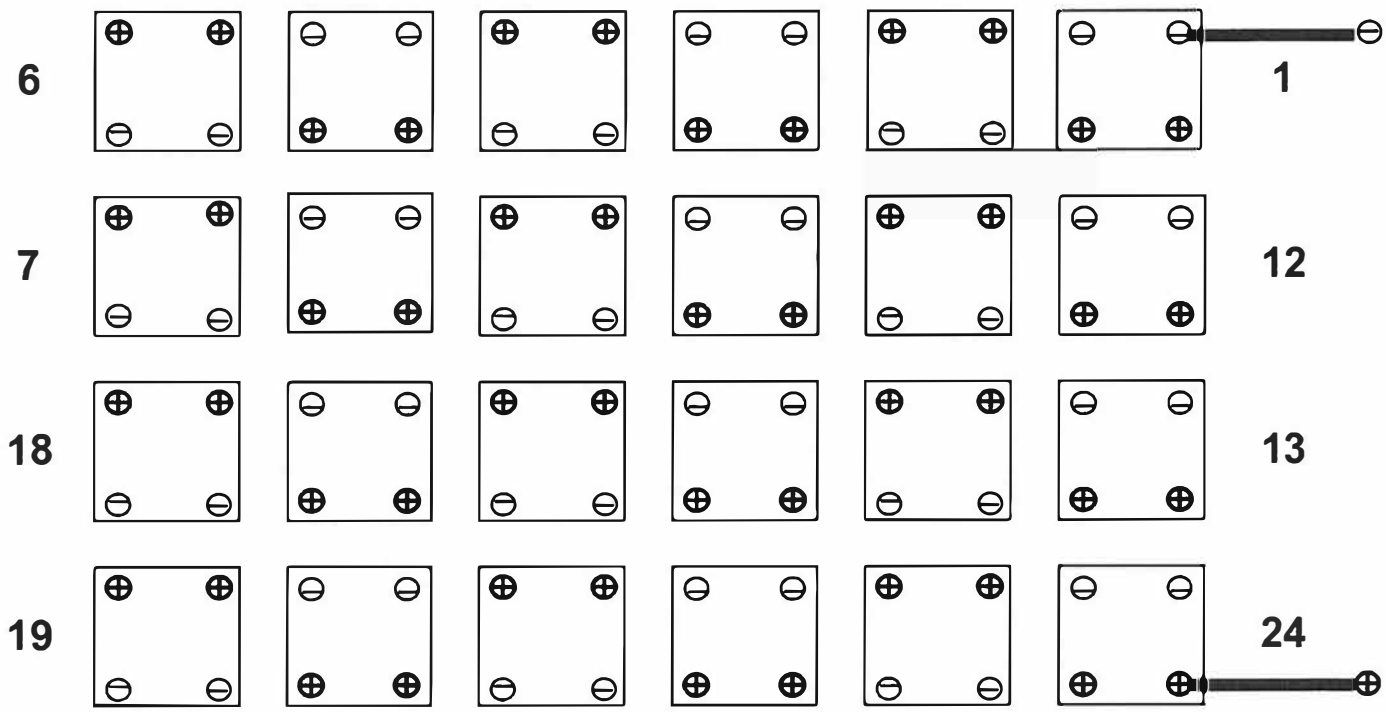
SERIES: _____

RATING: _____

MODEL No: _____

SERIAL No: _____

BANK VOLTAGE	Volts
LOAD CURRENT	Amps



CELL NUMBER	VOLTS
1	
2	
3	
4	
5	
6	
7	
8	

CELL NUMBER	VOLTS
9	
10	
11	
12	
13	
14	
15	
16	

CELL NUMBER	VOLTS
17	
18	
19	
20	
21	
22	
23	
24	

ATTACHMENT D

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

RFP 12-16

UPS AND DC POWER SYSTEMS

SCHEDULED MAINTENANCE AND SERVICES

TOSHIBA UPS SYSTEMS SPECIFICATIONS

(5)

	Model number	TM4-D650D634
	Rated output capacity	50 kVA/40 kW
	External dimensions, weight	1,000W x 870D x 1,500H mm (39.4 x 34.3 x 59.1 in); 850 kg (1,870 lb)
Input	Rated voltage	120/208 V
	Voltage variation	+10% to -25% (**)
	Rated frequency	60 Hz
	Frequency variation	±5%
	Number of phases/wires	3 phases/4 wires (neutral wire is necessary)
	*Power factor	More than 90%
	Required input kVA	62.5 kVA maximum
	Walk-in function	From 20% to 100% over 5 seconds
	Inrush current	Less than 6 times rated current under synchronous operation (input and output)
	Current limit	125% maximum
	*Harmonic currents	Less than 25% THD (total harmonic distortion)
Battery	DC voltage range	259 V to 387 V
	*Floating-charge regulation	±2.0% (floating charge set at 365 V, 2.25 V/cell)
	*Ripple voltage	2% r.m.s.
	Rated charging current	9.5 A
Output	Rated voltage	120/208 V
	Number of phases/wires	3 phases/4 wires
	Voltage regulation	±2% (0-100% balanced load); ±3% (100/100/0%, 100/0/0% load)
	Voltage adjustment range	±5% manually
	Phase displacement	±2° (0-100% balanced load); ±4° (100/0/0% load)
	Rated frequency	60 Hz
	Frequency regulation	±0.1% in free-running mode
	Frequency synchronous range	±0.5/1.0/1.5 Hz (±1.0 Hz standard) switch selectable on PWB by qualified technician
	Frequency slew rate	Slower than 1 Hz/second
	Voltage transients (recovery time: 50 msec)	±5% (100% load step change); ±5% (loss or return of input); ±8% (bypass to inverter)
	Inverter overload capacity	125% for 90 seconds; 150% for 30 seconds
	Bypass overload capacity	1,000% for 10 milliseconds, 125% for 10 minutes
	Crest factor	2.4
	Rated load power factor	0.8 lagging
	Neutral-line conductor size	1.73 times line conductor
	Harmonic voltage distortion	3% THD (100% linear load); 5% THD (100% rectifier load)
	Inrush current protection	Automatic transfer to bypass, and then retransfer to inverter
Environment	*Efficiency	ac/dc/ac: 86%; dc/ac: 90%
	Heat loss to be removed	5,750 kcal/h (22,170 Btu/h)
	*Audible noise	65 db (A) at 1 meter (3.3 ft) from the unit's front panel
	Operating temperature	0° to 40°C (32° to 104°F); optimal operation: 25°C (77°F)
	Operating humidity	Less than 90% RH (no condensation)
	Altitude	Less than 1,000 meters (3,300 ft)
Options	1) Equalizing (refresh) charge -- increases battery charging voltage 2) RS232C communication interface	

Items marked with an asterisk (*) are specified at rated conditions under balanced linear load

(**) When input voltage is between -15% and -25% continuously, output capacity should be kept within a range of 100% to 75% of rated output. Thus, if input is -15% below rated voltage, 100% output is acceptable. However, if input falls to -20%, set output to a maximum of 87.5% of rated capacity; if input falls to -25%, set output to 75% of rated capacity and so on.

(3)

	Model number	TM4-D620D634
	Rated output capacity	20 kVA/16 kW
	External dimensions, weight	600W x 870D x 1,100H mm (23.6 x 34.3 x 43.3 in); 380 kg (838 lb)
Input	Rated voltage	120/208 V
	Voltage variation	+10% to -25% (**)
	Rated frequency	60 Hz
	Frequency variation	±5%
	Number of phases/wires	3 phases/4 wires (neutral wire is necessary)
	*Power factor	More than 93%
	Required input kVA	25 kVA maximum
	Walk-in function	From 20% to 100% over 5 seconds
	Inrush current	Less than 6 times rated current under synchronous operation (input and output)
	Current limit	125% maximum
	*Harmonic currents	Less than 25% THD (total harmonic distortion)
Battery	DC voltage range	259 V to 387 V
	*Floating-charge regulation	±2.0% (floating charge set at 365 V, 2.25 V/cell)
	*Ripple voltage	2% r.m.s.
	Rated charging current	3.8 A
Output	Rated voltage	120/208 V
	Number of phases/wires	3 phases/4 wires
	Voltage regulation	±2% (0-100% balanced load); ±3% (100/100/0%, 100/0/0% load)
	Voltage adjustment range	±5% manually
	Phase displacement	±2° (0-100% balanced load); ±4° (100/0/0% load)
	Rated frequency	60 Hz
	Frequency regulation	±0.1% in free-running mode
	Frequency synchronous range	±0.5/1.0/1.5 Hz (±1.0 Hz standard) switch selectable on PWB by qualified technician
	Frequency slew rate	Slower than 1 Hz/second
	Voltage transients (recovery time: 50 msec)	±5% (100% load step change); ±5% (loss or return of input); ±8% (bypass to inverter)
	Inverter overload capacity	125% for 90 seconds; 150% for 30 seconds
	Bypass overload capacity	1,000% for 10 milliseconds, 125% for 10 minutes
	Crest factor	2.8
	Rated load power factor	0.8 lagging
	Neutral-line conductor size	1.73 times line conductor
	Harmonic voltage distortion	3% THD (100% linear load); 5% THD (100% rectifier load)
	Inrush current protection	Automatic transfer to bypass, and then retransfer to inverter
Environment	*Efficiency	ac/dc/ac: 86%; dc/ac: 90%
	Heat loss to be removed	2,300 kcal/h (8,700 Btu/h)
	*Audible noise	60 db (A) at 1 meter (3.3 ft) from the unit's front panel
	Operating temperature	0° to 40°C (32° to 104°F); optimal operation: 25°C (77°F)
	Operating humidity	Less than 90% RH (no condensation)
	Altitude	Less than 1,000 meters (3,300 ft)
Options	1) Equalizing (refresh) charge -- increases battery charging voltage 2) RS232C communication interface	

Items marked with an asterisk (*) are specified at rated conditions under balanced linear load.
(**) When input voltage is between -15% and -25% continuously, output capacity should be kept within a range of 100% to 75% of rated output. Thus, if input is -15% below rated voltage, 100% output is acceptable. However, if input falls to -20%, set output to a maximum of 87.5% of rated capacity, if input falls to -25%, set output to 75% of rated capacity, and so on.

5.0 Specifications

5.1 XL Plus Series Specifications

	MODEL NUMBER	UC3G2L100C6(1)	UC3G2L120C6(1)	UC3G2L180C6(1)
	CAPACITY	10 kVA (7 kW) (*)	12 kVA (8.4 kW) (*)	18 kVA (12.6 kW) (*)
Input	Input voltage	Single phase, 208/240 Vac, +10% to -30% (output capacity reduced when input voltage is below 85% of 240 Vac)		
	Input frequency	47 to 53 Hz, 57 to 63 Hz		
	Input capacity	10 kVA	12 kVA	18 kVA
	Input power factor	More than 0.95 lagging		
	Input harmonic distortion	Less than 10% (typ)		
Battery	Battery rated voltage	180 Vdc	216 Vdc	216 Vdc
	Battery backup time when fully charged with 0.7 power factor and 77° F (25° C)	7 mins. at full load (**) 20 mins. at half load (**)		
	Recharge time	Maximum 24 hrs to 100%, 90% in 10 hrs (***)		
	Type of batteries	Sealed lead-acid, maintenance free		
Output	Output voltage	Single-phase, 240/208/120 volts		
	Output voltage regulation	+3%/-3%, steady state (during normal or battery backup operation)		
	Output frequency	60 Hz ±0.1 Hz in free-running mode (line sync range ±1.0 Hz)		
	Output voltage waveform	Computer-grade sine wave, less than 3 % total harmonic distortion with linear load		
	Rated load power factor	0.7 lagging		
	Voltage transient characteristic	±8% under 100% load step change		
	Rated output current (rms)	41.6 A	50 A	75 A
	Maximum peak output current (peak)	125 A	150 A	225 A
	Inverter overload capacity	125% for 1 minute, 150% for 30 seconds		
	Bypass overload capacity	125% for 10 minutes, 1000% for 1 cycle		
	Crest factor	3.0		
Environment	Operating temperature	32 to 104° F (0 to 40° C)		
	Storage temperature	-4 to 104° F (-20 to 40° C)		
	Operating humidity	30 to 90%, no condensation		
	Altitude	Less than 3300 ft (1000 m) above sea level (****)		
	External dimensions	17.7W x 39.4H x 31.5D in (450W x 1000H x 800D mm)		
	Weight	584.2 lb (265 kg)	705.5 lb (320 kg)	956.8 lb (434 kg)
	Acoustical noise	55 dB (A) max. output, measured 3.3 ft (1 m) from front panel		
	Efficiency (ac-dc-ac)	Greater than 85%		
	Heat generation	4220 Btu	5060 Btu	7580 Btu
Switches	Bypass switch	Manual bypass provided		
	Bypass transfer switch	Static switch standard (transfer time, less than 4 mS)		
	Automatic retransfer switch	Provided (this function can be disabled)		
Interface	IBM AS/400 ® compatible signals (normally open contacts)	Signals (1) UPS on (2) UPS battery low (3) UPS bypass active (4) utility failure		
	RS232C ASCII interface	Provided		
Options	Novell ® local area network	Contact Toshiba for details on these options		
	SNMP Network Adapter			

(*) Input/output figures rated for 240 volts. Output will be reduced at 208 volt input or output.
(**) Battery backup time may vary depending on the operating conditions and ambient temperature at the installation site.
(***) An initial charge time of 24 hrs. is necessary to obtain proper battery performance level before unit is placed in operation.
(****) At 6600 ft (2000 m) above sea level, output capacity should be derated by 3%.

Novell ® is a registered trademark of Novell Inc., IBM AS/400 ® is a registered trademark of International Business Machines Inc.

5.0 Specifications

5.1 XL Plus Series Specifications

	MODEL NUMBER	UC3G2L024C6	UC3G2L036C6	UC3G2L060C6
	CAPACITY	2.4 kVA (1.68 kW) (*)	3.6 kVA (2.52 kW) (*)	6 kVA (4.2 kW) (*)
Input	Input voltage	Single phase, 208/240 Vac, +10% to -30% *		
	Input frequency	45 to 65 Hz		
	Input capacity	2.4 kVA	3.6 kVA	6 kVA
	Input power factor	Approximate unity (0.98 to 1.0 lagging)		
	Input harmonic distortion	Less than 5% (typ)		
Battery	Battery rated voltage	96 Vdc	144 Vdc	216 Vdc
	Battery backup time when fully charged with 0.7 power factor and 77° F (25° C)	7 mins. at full load (**) 30 mins. at half load (**)		
	Recharge time	Maximum 24 hrs to 100%, 90% in 10 hrs (***)		
	Type of batteries	Sealed lead-acid, maintenance free		
Output	Output voltage	Single-phase, 240/208/120 volts		
	Output voltage regulation	±3%, steady state (during normal or battery-backup operation)		
	Output frequency	50/60 Hz ±0.1% in free-running mode (line sync range ±1.0%)		
	Output voltage waveform	Computer-grade sine wave, less than 3.0% total harmonic distortion with linear load		
	Rated load power factor	0.7 lagging		
	Voltage transient characteristic	±8% under 100% load step change		
	Rated output current (rms)	10.0A	15.0A	25.0A
	Maximum peak output current (peak)	30.0A	45.0A	75.0A
	Inverter overload capacity	125% for 1 minutes, 150% for 30 seconds		
	Bypass overload capacity	125% for 10 minutes, 1000% for 1 cycle		
	Crest factor	3.0		
Environment	Operating temperature	32 to 104° F (0 to 40° C)		
	Storage temperature	-4 to 104° F (-20 to 40° C)		
	Operating humidity	30 to 90%, no condensation		
	Altitude	Less than 3000 ft (1000 m) above sea level (****)		
	External dimensions	9.9W x 22.2H x 27.2Din (250W x 564H x 690D mm)	9.9W x 22.2H x 27.2Din (250W x 564H x 690D mm)	9.9W x 28.0H x 31.6Din (250W x 700H x 790D mm)
	Weight	175 lb (80.0 kg)	220 lb (100.0 kg)	321 lb (146.0 kg)
	Acoustical noise	50 dB (A) max. output, measured 3.3 ft (1 m) from front panel		
	Efficiency (ac-dc-ac)	Greater than 85%		
	Heat generation	300W (1030 Btu/hr)	450W (1550 Btu/hr)	750W (2580 Btu/hr)
Switches	Bypass switch	Manual bypass provided		
	Bypass transfer switch	Static switch standard (transfer time less than 4 mS)		
	Automatic retransfer switch	Provided (this function can be disabled)		
Interface	IBM AS/400 ® compatible signals (normally open contacts)	Signals: (1) UPS on (2) UPS battery low (3) UPS bypass active (4) utility failure		
	RS232C ASCII interface	Provided		
Options	Novell ® local area network	Contact Toshiba for details on these options		
	SNMP Network Adapter			

(*) Input/output figures rated for 240 volts. Output capacity will be reduced when input voltage is below 204 volts.
(**) Battery backup time may vary depending on the operating conditions and ambient temperature at the installation site.
(***) An initial charge time of 24 hrs. is necessary to obtain proper battery performance level before unit is placed in operation.
(****) At 6000 ft (2000 m) above sea level, output capacity should be derated by 3%.

TOSHIBA

Leading Innovation

4400 SERIES

UNINTERRUPTIBLE POWER SYSTEMS

4400 SERIES

NEXT GENERATION TECHNOLOGY.

The Toshiba 4400 Series uninterruptible power system (UPS) is the next-generation three-phase UPS. The double-conversion, all insulated-gate bipolar transistor (IGBT) 4400 Series UPS features a digitally controlled IGBT input rectifier, an intelligent low harmonic pulse-width modulation (PWM) output, state-of-the-art electronic battery isolation circuitry, and an easy to navigate local touchscreen interface. The small footprint and total front access mechanical design requires zero rear clearance and includes features such as top, bottom, and/or side cable entry, standard sized air filter provisions, and lockable keyed doors. Customization is available through a number of options, such as internal battery backup, internal transformers for specific voltage applications, and remote monitoring with the Toshiba RemotEye® 4 multi-protocol UPS monitoring solution.

- 0.9 Power Factor
- High Efficiency
- Small Footprint
- Easily Installed

MODEL	Model Number	4400X3X150XA	4400X3X200XA	4400X3X250XA	4400X3X300XA	4400X3X500XA	4400X3X800XA
	Capacity	15 kVA (13.5 kW)	20 kVA (18 kW)	25 kVA (22.5 kW)	30 kVA (27 kW)	50 kVA (45 kW)	80 kVA (72 kW)
	Topology	True On-Line, Double-Conversion, All-IGBT Technology					
INPUT	Voltage (Standard)	208/120V Three-phase, Four-Wire + Ground Input					
	Voltage Range	-15% to +10% (Without Using Battery)					
	Power Factor	> 0.98					
	Current THD	< 5% at 100% Load					
	Frequency	50 ±5 Hz, 60 ±5 Hz					
OUTPUT	Voltage (Standard)	208/120 V: Three-Phase, Four-Wire + Ground					
	Frequency	50/60 Hz, ±0.1% Auto-Sensing Standard (50/60Hz Selectable, for use as Frequency Converter)					
	Voltage Regulation	±2.0%					
	Power Factor	0.9 Lagging					
	Overload	Inverter: 125% for 90 Seconds, 150% for 30 Seconds Bypass: 125% for 10 Minutes, 1000% for 10 Milliseconds					
BATTERY	DC Link	288 VDC					
	Ripple Voltage	< 0.5% DC					
ENVIRONMENT	Temperature Range	32° to 104°F (0° to 40°C)					
	Relative Humidity	5% to 95% Non-Condensing					
	Heat Rejection	4556 BTUs/Hour	6074 BTUs/Hour	7395 BTUs/Hour	9111 BTUs/Hour	15,186 BTUs/Hour	24,297 BTUs/Hour
	Full-Load Efficiency	91.0%					
	25% Load Efficiency	88.8%					
	Altitude	3300 ft. (1000 m) Maximum Without Derating					
	Air Filtration	Airflow Front to Top with Provisions for Front-Located Air Filters					
DIMENSIONS	Dimensions	20.12" (W) x 37.4" (D) x 65.06" (H) (511mm x 950mm x 1653mm)				32.1" (W) x 31.8" (D) x 73.6" (H) (816mm x 807mm x 1870mm)	
	Weight[3]	720 lbs. (326 kg)				1350 lbs. (612 kg)	1500 lbs. (680 kg)
COLOR	O'Brien Black (Textured Powder Coat)						
MONITORING	Touchscreen Operator Interface, UPS Status N/O Dry Contacts, RS232C Interface (Optional RemotEye® 4 Intelligent Monitoring System)						
OPTIONS	Internal Batteries, Transformers, Dual-Input Feed, RemotEye® Intelligent Monitoring System, Remote Status Alarm Panel, Air Filters						
STANDARDS	UL 1778, CUL, ISO9001, ISO14001:2004, ANSI C62.41 (IEEE 587), NEMA/PET-1993, CE, IBC, & CBC (OSHPD)						
WARRANTY	3-Year On-Site Warranty; 5-Year Warranty Available; See Toshiba Warranty Policy for Full Details						
SERVICE	24-Hour, 365-Day Technical Support: 1-877-867-8773						

[1] *Isolation and Auto Transformer Options for Input Voltage Conversion*
[2] *Auto Transformer Options for Output Voltage Conversion*
[3] *Unit Weight Not Including Internal Battery and Transformers*

Specifications subject to change without notice.

OPTIONS & ACCESSORIES

BATTERY CABINETS

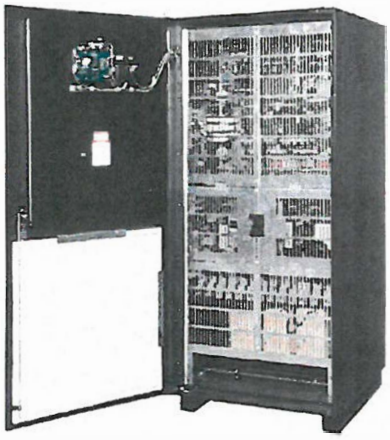
Matching battery cabinets with Valve-Regulated Lead Acid (VRLA) batteries provide uniform installation appearance with various run times. The Toshiba 4400 Series UPS works equally well with either VRLA or flooded-cell battery backup.

AUXILIARY CABINETS

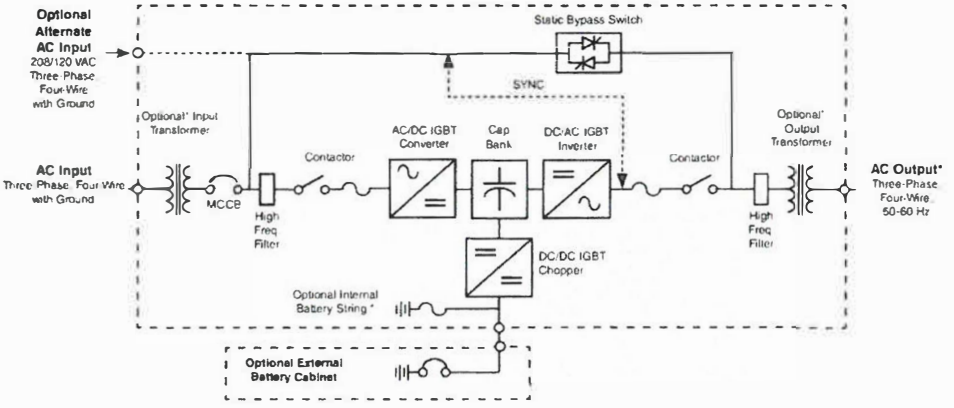
Matching auxiliary cabinets are available for uniform installation appearance. Options include maintenance bypass switch (MBS), power distribution, and subfeed breakers.

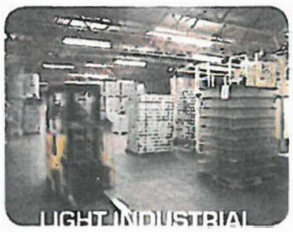
UPS MONITORING

RemotEye® 4 offers real-time control, monitoring, and analysis of UPS operation. The quick and easy-to-use software can automatically initiate an orderly shutdown to connected servers to minimize any risk of data loss. RemotEye® 4 also features a first-ever mobile website for monitoring UPS status updates on-the-go. Universal communications protocols compatible with RemotEye® 4 include Modbus TCP & RTU, BACnet IP & MSTP, HTTP/HTTPS, and SNMP. Compatibility with IPv6 also is included.



4400 Series UPS Diagram





ATTACHMENT E

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

RFP 12-16

UPS AND DC POWER SYSTEMS

SCHEDULED MAINTENANCE AND SERVICES

PCP TWIN PACK PLUS

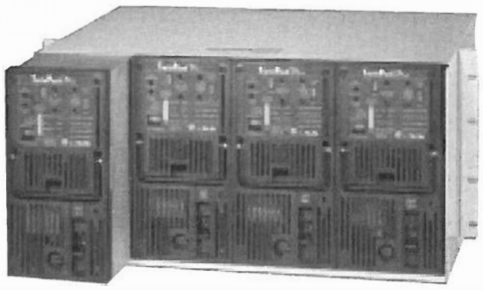
DC POWER SYSTEMS SPECIFICATIONS

power conversion products, llc
– The switchmode company™

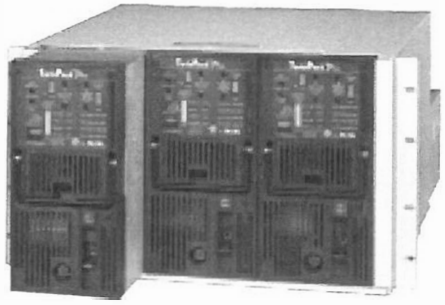
A3167
ISO 9001

Bulletin: 368F

TwinPack Plus® - CE



23" (58 cm) Wide Shelf



19" (48 cm) Wide Shelf

The *TwinPack Plus*®-CE DC Power System is the latest innovative modular DC power product offered by PCP. *TwinPack Plus*® is offered in a choice of 23" (58 cm) wide or 19" (48 cm) wide mounting shelves. The 23" (58 cm) wide shelf will accept a maximum of four modular plug-in rectifiers; the 19" (48 cm) wide shelf will accept a maximum of three. The shelves accept individual AC feeds for each rectifier. The four-across shelf measures 10.5" (27 cm) H x 23" (58 cm) W x 24" (61 cm) D. It weighs 49 lbs. (22.7 kg.). The three-across shelf is 10.5" (27 cm) H x 19" (48 cm) W x 24" (61 cm) D, and weighs 45 lbs. (20.45 kg.).

Seven rectifier modules are offered. High output (3000 watt) rectifiers accept AC inputs ranging from 176 to 264 VAC, 45 to 65 Hz, single phase and include the following outputs: -48 VDC/50 amps, +24 VDC/100 amps, and -24 VDC/100 amps. Lower output (1500 watt) rectifiers accept AC inputs ranging from 85 to 264 VAC and include the following outputs: -48 VDC/25 amps, +24 VDC/50 amps, and -24 VDC/50 amps. In addition, a 12 VDC/100 amps module is offered without the CE mark. All rectifiers will operate and produce full output in an environment of -40°C to +65°C. See page 4 for specific model and part numbers.

Each rectifier is connectorized to plug into a backplane panel. Rectifier modules can be added or replaced in the field while the plant is fully operational (HOT SWAP). Rectifiers are connected in a forced load sharing mode. Shelves can be stacked on top of each other in standard 23" (58 cm) or 19" (48 cm) wide rack frames. No heat deflectors are required between shelves. P/N 0000880283, 7/16" (11mm) Nut Driver, is used for final installation of each rectifier module (order separately).

Redundant rectifiers are offered on an N+1 basis. Should one rectifier fail, the remaining rectifiers will remain fully operational. Forced paralleling (current sharing) is included with each rectifier module.

Rectifier Dimensions & Weight

- Modular design - 10" (25 cm) high x 5" (13 cm) wide x 15" (38 cm) deep.
- 24 lbs. (10.90 kg.) net weight.

Regulating

- Module: UL Recognized and CSA Certified. All rectifier modules bear the UL Recognition (UL 1950) mark for the USA and Canada and the CE mark for European Conformity.
- System (includes the mounting shelf): UL Listed (UL 1950) and CSA Certified and bears the UL Listing mark for the USA and Canada and the CE mark for European Conformity.

Operating Environment

- Operating temperature range: -40°C (-40°F) to +65°C (+149°F) up to 5,000 feet (derate 2°C per 1,000 ft. above 5,000 ft).

Cooling

- Each rectifier includes an integral fan for horizontal (front to back) fan cooling. A red fan fail LED is provided. If the fan fails, the rectifier fail alarm and LED will activate. Fan is field replaceable.

EMC

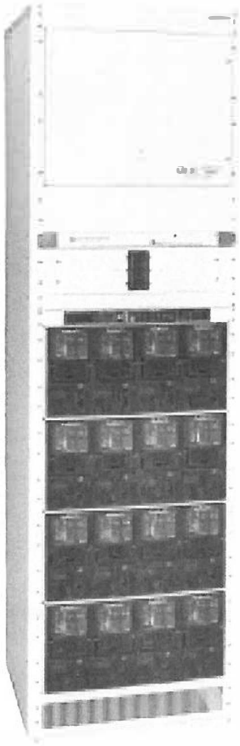
- The system (shelf and rectifier module) meets FCC Part 15, Subpart B, Class A. Also complies with the Generic Standard EN50081-1 (1992). The system complies with IEC-1000-3-2 conducted harmonic currents 0 to 2 kHz. Also complies with EN55022, Class A: EMC conducted 0.15 mHz - 30 mHz. EN55022 Class A: EMC radiated 0.03 - 16 Ghz.

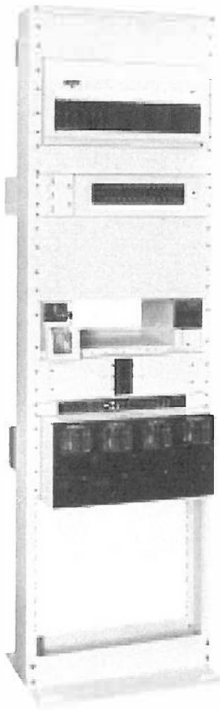
Audible/Acoustic Noise

- Each rectifier has a maximum audible noise of less than 54 dBA when measured 3 feet from the equipment, while operating at no load, partial load, or full load.

power conversion products, llc 115 erick street crystal lake, illinois 60014-4533
phone (815) 459-9100 phone (800) 447-3484 fax (815) 459-9118 fax (800) 526-2524 e-mail: info@pcp.com
domestic 24-hour service helpline (800) 435-4872 *international* 24-hour service helpline 1 (815) 479-0682

TwinPack Plus®
-48 VDC/800A Power System.





TwinPack Plus®
+24/-48 VDC Power System.

Specification Compliance
- Rectifier and shelf comply with the seismic requirements of Telcordia Technologies GR-63-CORE (Zone 4).
- Complies with applicable portions of Telcordia Technologies GR-947.

Immunity
The rectifier and mounting shelf system meets the Telcordia Technologies immunity criteria stated in GR-1089-CORE, Issue 1, Nov. 1994, "Electromagnetic Compatibility and Electrical Safety Generic Criteria for Network Telecommunication Equipment". The system also complies with the Generic Standard EN50082-2 (1994).

IEC1000-4-2: ESD Level 4; 8kv contact,
15kv air discharges.
IEC1000-4-3: RF field immunity: Level 3; 10v/m.
IEC1000-4-4: Electrical fast transient/burst
immunity: Level 4;
ac input: 4kv, 2.5khz
dc output: 4kv, 2.5khz
control lines: 2kv, 5khz
IEC1000-4-5: Surge immunity test 1.2/50µs
(voltage) 8/20µs (current): Level 4;
ac input (line to line): 2kVpk 1.2/50 (8/20)µs
ac input (line to gnd): 4kVpk 1.2/50 (8/20)µs
dc output (line to line): 2kVpk 1.2/50 (8/20)µs
dc output (line to gnd): 4kVpk 1.2/50 (8/20)µs
control signals (line to gnd): 0.5kVpk 1.2/50 (8/20)µs
ANSI/IEEE C62.41-1991. *Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.* IEEE Location B3/C1 both combination waveform (1.2/50µs - 8/20µs) at 6.0 kV, 3.0 kA and ring waveform (0.5µs - 100 kHz) at 6.0 kV, 0.5 kA.

Input Voltage Range (Single Phase)
- 3000 Watt Modules: 176 to 264 VAC, 45 - 65 Hz.
- 1500 Watt Modules: 85 to 264 VAC, 45 - 65 Hz.

Output Voltage Range
- Output voltage range is 47 to 56 VDC (float) and 51 to 60 VDC (equalize) -48 VDC rectifiers; 22 to 28 VDC (float) and 24 to 30 VDC (equalize) ±24 VDC rectifiers; and 11 to 14 VDC (float) and 12 to 15 V DC (equalize) +12 VDC rectifiers.

Output Current
- 3000 Watt Modules 50A (-48 VDC); 100A (±24 VDC).
- 1500 Watt Modules 25A (-48 VDC); 50A (±24 VDC); 100A (+12 VDC) (non-CE).
- Output current limit is set at 105% of rated current. The rectifier will protect itself from an output short circuit by limiting the output current to 105%. Once the short circuit is removed, the rectifier will automatically resume normal operation.

Efficiency
- >90% Efficiency at 100% load (24 VDC and 48 VDC models).

Power Factor
- Advanced power factor correction design using MOSFETS and 75 kHz switching.
- .98 Power factor minimum from 50% load to 100% load.
- .995 Power factor at full load and nominal input.

Harmonic Distortion
- <5% Total harmonic current distortion (50% to 100% load), 3000 watt models.
- <9% Total harmonic current distortion (50% to 100% load), 1500 watt models.
- Meets IEC-1000-3-2 (limits for harmonic current).

Voltage Regulation
- ±0.5% voltage regulation from no load to full load and under all line and environmental conditions.

Noise
- Filtered output (measurements taken with resistive load - no battery). All units are less than the values stated below:
  - 26 dBrn-c measured on a 3A noise set or equal.
  - 19 mV RMS between 0 and 10 MHz;
    5 mV RMS between 0 and 100 kHz.
  - 200 mV peak-to-peak from 0 to 100 MHz.
  - 100 mV peak-to-peak from 0 to 20 MHz.

UL Listing
- UL Listed input (AC) fuses and output (DC) breaker included in each rectifier.

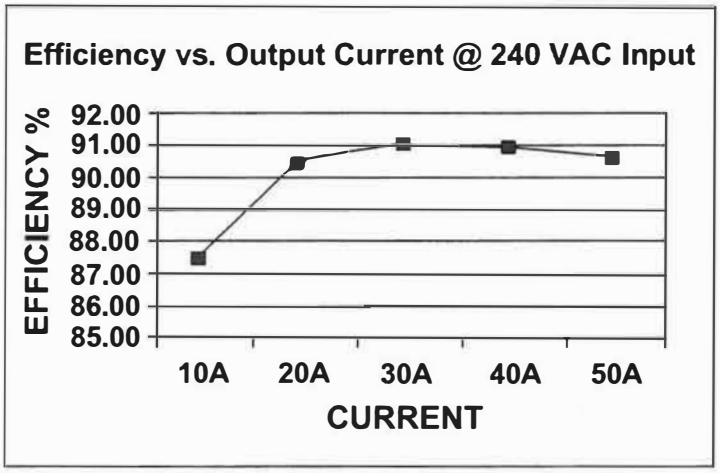
Features

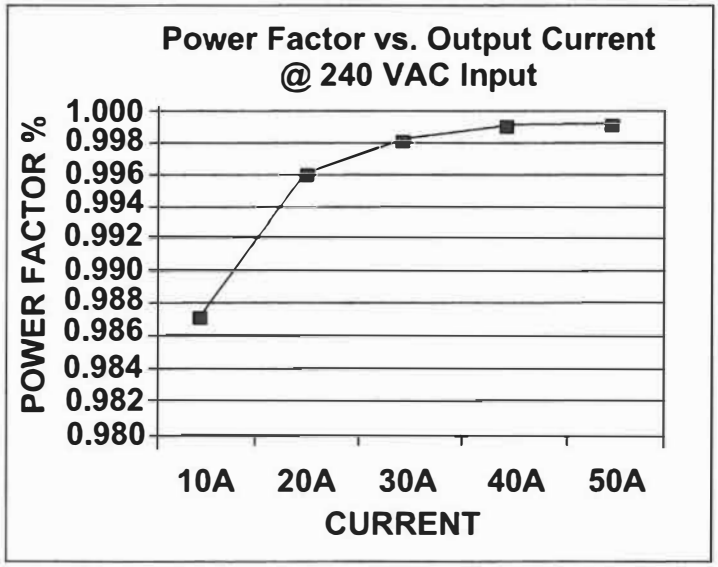
- Fully connectorized for hot plug-in operation.
- Battery eliminator design.
- *Hot plug-in protection.* Each rectifier is equipped with a mechanical device that prevents the DC breaker from being in the ON position during installation of the rectifier.
- Forced load sharing (current sharing) for parallel operation.
- Current walk-in feature (0 to 90% output in 8 seconds).
- Peak in-rush current at 176 VAC input is less than 25 amps maximum.
- Remote sensing (will automatically switch to local sensing if DC breaker opens).

ALARMS, CONTROLS, INTERFACES

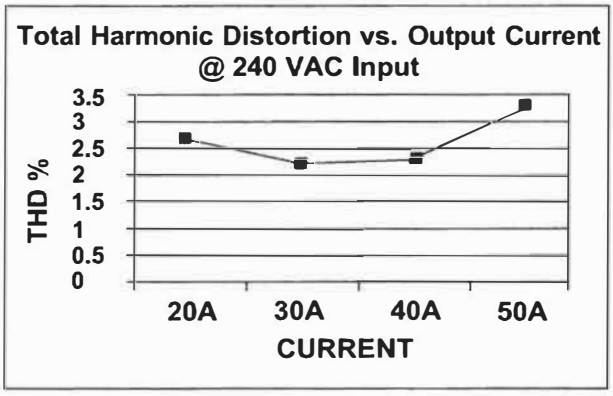
Each rectifier is equipped with:

- Separate output controls for float and equalize operation with a selector switch.
- Green LED indicator for float operation; amber LED indicator for equalize operation.





- The rectifier can be remotely changed from float to equalize and back to float.
- Adjustable high DC voltage shutdown (HVS) controls with auto-restart. Red LED to indicate HVS shutdown.
- High DC voltage shutdown is adjustable in 0.5 volts DC increments. Remote restart is included.
- Backup high DC voltage shutdown set at 62.0 VDC for the 48 VDC rectifiers, and 31.0 VDC for the 24 VDC rectifiers.
- Red LED indicator to indicate rectifier fail.
- Red LED indicator to indicate open DC circuit breaker.
- Green LED indicator to indicate rectifier OK.
- Two sets of test points on the front cover of each rectifier to measure rectifier output voltage (on rectifier side of DC output breaker) and to measure remote sense voltage.
- Green LED ammeter that indicates percentage of output current in 10% increments.
- Forced paralleling, load sharing circuit with enable/disable dip switch.
- High temperature shutdown and red LED. Auto restart (after approximately 12 min.) is included.
- Remote rectifier turn on and turn off (via switch or micro-processor monitor).
- Yellow LED indicator to indicate open sense lead. If either one or both remote sense leads are disconnected, the rectifier automatically returns to local sensing.
- Rectifier test switch (NL/FL) on the front panel.
- Red LED indicator for fan failure.
- Green LED for AC OK to indicate that AC is present at the input of the rectifier. If AC fuses blow, the green LED will extinguish.
- Each rectifier is capable of **temperature compensated charging** when connected to PCP's SSD2 or SSD3.2 Panels.



Ordering Information.

***TwinPack Plus*® -CE Mounting Shelves. (Both shelves accept all rectifier modules listed below.)**

Part Number	Description
7002324100 Carries the CE Mark	Four-Across Rectifier Mounting Shelf, 23" (58 cm) wide x 10.5" (27 cm) high x 24" (61 cm) deep. 49 lbs. (22.7 kg.). UL Listed Mounting Shelf will accept up to four each -48 VDC, +24 VDC, or -24 VDC Rectifier Modules.
7002324101 Carries the CE Mark	Three-Across Rectifier Mounting Shelf, 19" (48 cm) wide x 10.5" (27 cm) high x 24" (61 cm) deep. 45 lbs. (20.45 kg.). UL Listed Mounting Shelf will accept up to three each -48 VDC, +24 VDC, or -24 VDC Rectifier Modules.
7002324102 CE Mark Pending	Four-Across Rectifier Mounting Shelf, 23" (58 cm) wide x 12.25" (31 cm) high x 18.5" (47 cm) deep. 49 lbs. (22.7 kg.). Mounting Shelf will accept up to four each -48 VDC, +24 VDC, or -24 VDC Rectifier Modules. Contact factory for availability.
7002324103 CE Mark Pending	Three-Across Rectifier Mounting Shelf, 19" (48 cm) wide x 12.25" (31 cm) high x 18.5" (47 cm) deep. 45 lbs. (20.45 kg.). Mounting Shelf will accept up to three each -48 VDC, +24 VDC, or -24 VDC Rectifier Modules.

Notes: 1. Each TWPP Mounting Shelf is equipped with alarm connector and harness for connecting to SSD2 Panel.
2. Order P/N 0000880283, 7/16" (11mm) Nut Driver for final installation of each rectifier module.
3. Order filler panels separately - P/N 2311211643.

Rectifier Modules (UL Recognized Component. For installation in *Twin PackPlus*® -CE Mounting Shelves only).

Model Number	Part Number	AC Input Volts, Hz	DC Output Voltage/Amps
MOD P4850TC-CE	9155100220	176 to 264 VAC, 45-65 Hz	-48 VDC/50 Amps
MOD P24N100TC-CE	9155100221		+24 VDC/100 Amps
MOD P24100TC-CE	9155100222		-24 VDC/100 Amps
MOD P4825TC-CE	9155100223	85 to 264 VAC, 45-65 Hz	-48 VDC/25 Amps
MOD P24N50TC-CE	9155100224		+24 VDC/50 Amps
MOD P2450TC-CE	9155100225		-24 VDC/50 Amps
MOD P12N100TC*	9155100126		+12 VDC/100 Amps

AC Input Current (Input voltage range: 176 to 264 VAC).

Rectifier Model Number	Nominal DC Volts	DC Amps	AC Input Amps @ 2600 watts output 176 VAC	208 VAC	220 VAC	240 VAC
MOD P24100TC-CE	-24	100	16.9	14.3	13.5	12.4
MOD P24N100TC-CE	+24	100	16.9	14.3	13.5	12.4
MOD P4850TC-CE	-48	50	16.6	14.0	13.3	12.0

AC Input Current (Input Voltage Range: 85 to 264 VAC).

Rectifier Model Number	Nominal DC Volts	DC Amps	AC Input Amps @ 1300 watts output 85 VAC	120 VAC	176 VAC	208 VAC	220 VAC	240 VAC
MOD P12N100TC*	+12	100	17.5	12.4	8.5	7.2	6.8	6.2
MOD P2450TC-CE	-24	50	17.5	12.4	8.5	7.2	6.8	6.2
MOD P24N50TC-CE	+24	50	17.5	12.4	8.5	7.2	6.8	6.2
MOD P4825TC-CE	-48	25	16.9	12.0	8.3	7.0	6.6	6.0

Heat Dissipation.

Rectifier Model Number	Output Power (watts)	Input Voltage (amps)	BTU/Hr.
MOD P24100TC-CE	2600	240	1040
MOD P24N100TC-CE	2600	240	1040
MOD P4850TC-CE	2600	240	980
MOD P2450TC-CE	1300	240	520
MOD P12N100TC*	1300	240	520
MOD P24N50TC-CE	1300	240	520
MOD P4825TC-CE	1300	240	490

Notes:

1. **The *Twin Pack Plus*® -CE rectifier system can be configured in many variations of DC power systems up to 5,000 Amps. Contact the factory or your local sales agent for plant configurations.**
2. **Each rectifier will provide a full 3000 watts (or 1500 watts) of power output. These measurements are stated at 2600 watts (or 1300 watts) as these are the typical operating levels.**

* **Does not carry the CE Mark.**

ATTACHMENT E-1

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

RFP 12-16

UPS AND DC POWER SYSTEMS

SCHEDULED MAINTENANCE AND SERVICES

PCP MINI POWER SYSTEM SPECIFICATIONS

Introducing PCP's Latest Product... the MPS

Bulletin: 378J

PCP's Mini Power System (MPS) is another unique, plug-in, hot swappable DC Power System for powering telecommunications equipment. The basic system is only 5.02" (12 cm) high (3 RU) x 14" (32 cm) deep x 19" (48 cm) or 23" (58 cm) wide and consists of a monitor, controller, LVLD contactor (optional) and distribution panel and three each plug-in rectifiers (500 watts each). All equipment is designed to operate in an uncontrolled environment of -40°C to +70°C.

Optional rectifier shelves and modules can be added to a maximum capacity of 75 amps at -54 VDC. Each additional shelf occupies 1-1/2 rack spaces (2.66"). A fully expanded 75 amp system is 10.5" (24 cm) (6 RU) high.

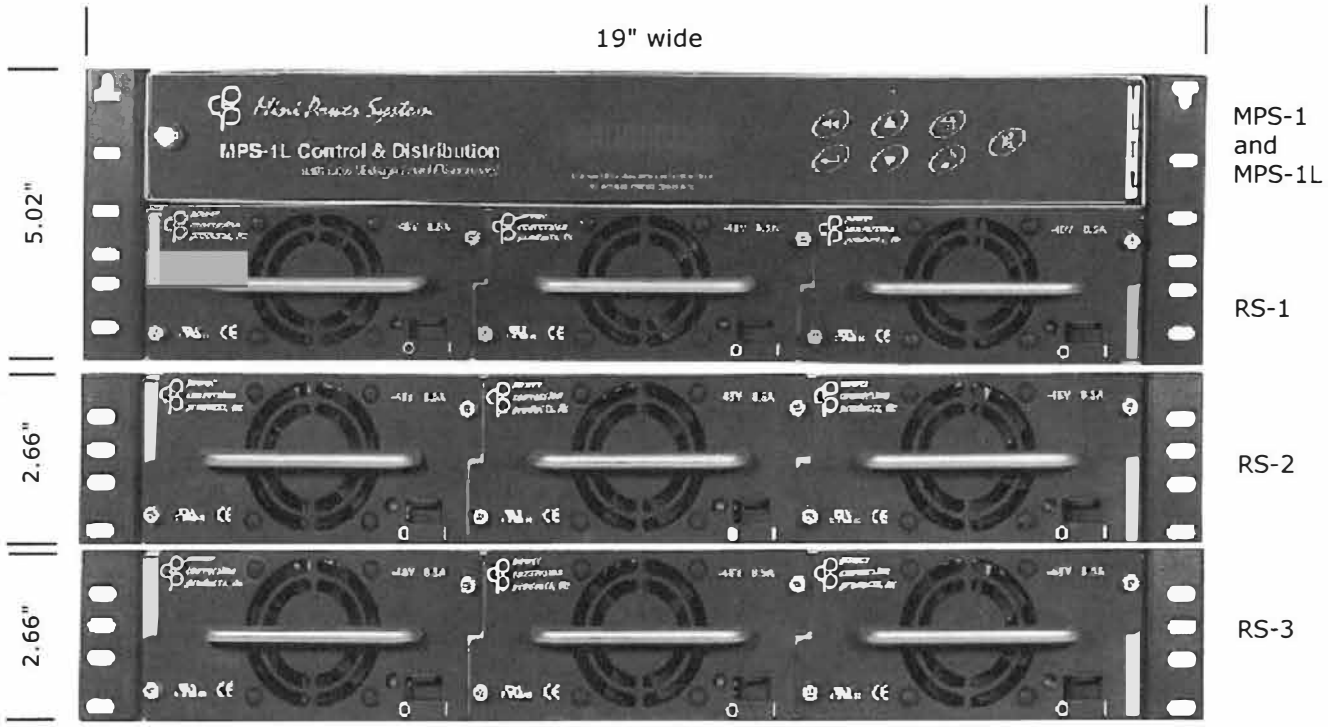


Figure 1. Front view of MPS (door closed).

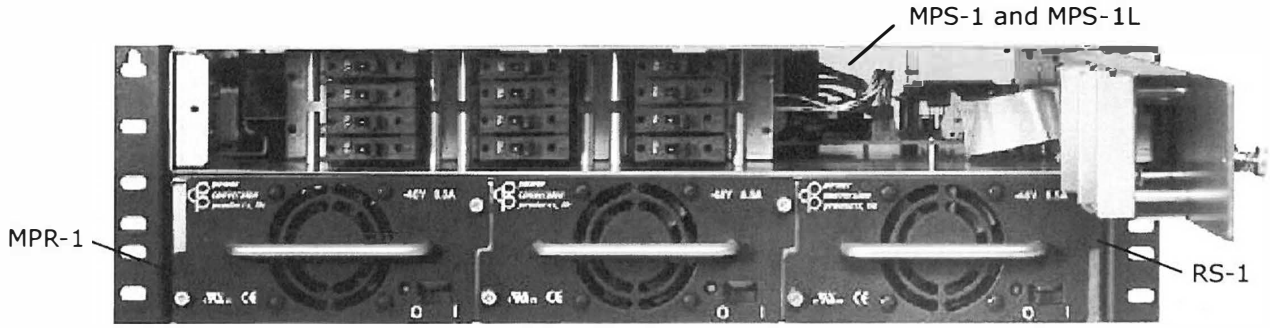


Figure 2. Inside view of MPS (door open).

power conversion products, llc
115 erick street
crystal lake, IL 60014-4533 USA
phone: 815-459-9100
fax: 815-459-9118
www.eltekenergy.com

Rectifier Features

- AC Input: 85 to 264 VAC, 47 to 63 Hz, single phase.
- AC Input connections are made to a three-position terminal block (one per shelf).
- Output Voltage: Adjustable from 48 VDC to 58 VDC, factory set at -54.5 VDC.
- Output Current: Will produce 8.5 amps at -54 VDC over an ambient temperature range of -40°C to +50°C and will automatically derate to a minimum of 5.5 amps at -54 VDC from +51°C to +70°C.
- Power Factor: Active power factor correction circuitry achieves >.98 PF from 25% to full load.
- Output Voltage Regulation: Less than +/-0.5% from no load to full load with 85 to 264 VAC input voltage variation.
- Current Limiting: Factory set at 125% of rated output.
- Current Walk In: Slow start (minimum of 8 seconds to 90% full output).
- Forced Load Sharing.
- Voice Frequency Noise: <32 dBrnc without battery connected.
- Wide Band Noise: <30 mv. rms from 0 to 30 Mhz without battery connected.
- AC Input Protection: UL Input fuses.
- DC Output Protection: Isolation diode in -48 VDC lead.
- Cooling: Internal fan.
- Lightning Protection: Meets EN6100-4-4: 1995 and EN61000-4-5: 1995 (contact factory for details).
- EMI: Rectifier when mounted in the shelf will not exceed FCC, Part 15, Subpart B, Class B and EN55011: 1991.
- Audible Noise: Less than 65 dbA when measured 3 feet in front of the rectifier.
- Remote Sensing.
- Rectifiers and Rectifier Shelves UL Recognized, tested and certified to NEBS Level 3.

Monitor/Distribution Panel Features

- Auto Set-Up of Rectifier Output Voltage: Single adjustment sets output voltage of all rectifiers.
- Maximum of 12 UL Recognized (front replaceable) circuit breakers (1 to 30 amps each). Double pole breakers are required for applications in excess of 15A.
- Digital display (2 rows x 20 characters) for system voltage, system current, and individual rectifier output currents.
- Automatic equalize timer on Low Battery Voltage or AC Fail.
- Alarms: Maximum of four sets of Form "C" contacts (user definable) of any of the following.
  - Rectifier Minor/Major Fail Alarms.
  - AC Minor/Major Fail Alarms.
  - High DC Voltage Alarm.
  - Low DC Voltage Alarm.
  - Very Low DC Voltage Alarm.
  - Low Voltage Disconnect Operation.
  - Distribution Breaker Trip.
  - Any Rectifier Low Current Alarm.
  - High Battery Temperature Alarm.
  - Summation Alarm.
- Low DC Voltage Load Disconnect (optional) - 80 Amps.
- Battery Terminations for 3 strings (#8 AWG), 2 strings (#4 AWG), or 1 string (1/0 Wire).
- Maximum of three (3) temperature probes for monitoring internal battery temperature during temperature compensation battery charging. Probes must be ordered separately.

Ordering Information

Model Number	Part Number	Description
MPS-1L	8804821024	19" Monitor and Distribution Shelf with one RS-1 Rectifier Shelf and Low Voltage Load Disconnect
MPS-1L	8804821025	23" Monitor and Distribution Shelf with one RS-1 Rectifier Shelf and Low Voltage Load Disconnect
MPS-1	8804821026	19" Monitor and Distribution Shelf with one RS-1 Rectifier Shelf
MPS-1	8804821027	23" Monitor and Distribution Shelf with one RS-1 Rectifier Shelf
RS-2	7004815012	RS-1 Rectifier Shelf with special 19" and 23" mounting brackets for rectifier shelf position 2
RS-3	7004815013	RS-1 Rectifier Shelf with special 19" and 23" mounting brackets for rectifier shelf position 3
MPR-1-48	9143100025	Rectifier Module (-54 VDC, 8.5 A)
MPR-BP	0000954781AU	Blank Filler Plate for unused rectifier position.

Distribution Circuit Breakers (front accessible, maximum of 12)

Single-Pole Breaker		Double-Pole Breaker	
Part Number	DC Amps	Part Number	DC Amps
1345050101	5	1345110210	20 (2x 10A)
1345110100	10	1345120210	24 (2x 12A)
1345115101	15	1345160210	32 (2x 16A)

Temperature Probes (for temperature compensation battery charging)

Part Number	Maximum per System	Battery Post
0000926862	3	1/4"

Warranty
PCP's standard warranty applies.
See Bulletin 707.

power conversion products, llc
115 erick street
crystal lake, IL 60014-4533 USA
phone: 815-459-9100
fax: 815-459-9118
www.eltekenergy.com

ATTACHMENT F

HILLSBOROUGH COUNTY SHERIFF'S OFFICE

RFP 12-16

UPS AND DC POWER SYSTEMS

SCHEDULED MAINTENANCE AND SERVICES

GNB ABSOLYTE IIP
BATTERY SPECIFICATIONS

Installation and Operating Instructions For ABSOLYTE® IIP Batteries 50A 90A 100A

UL Recognized Component

11.0 Protective Module covers

Each module is provided with a transparent protective cover to help prevent accidental contact with live module electrical connections, and to provide easy visual access to the system.

When all system assembly has been completed, as well as initial testing including initial charge and cell float voltage readings, all covers should be installed. Covers should remain in place at all times during normal operation of the battery system.

11.1 Transparent Cover Installation

The transparent cover is assembled by lining up the holes in the legs with the corresponding holes in the cover and then inserting the snap rivets into the holes and depressing the head of the rivets so that the legs are locked in place (see Figure 24).

The cover is then installed by grasping it so that the GNB logo is upright. Place the top feet of the cover legs onto the top tray channel. Then compress the legs by pushing up on the bottom of the cover while positioning the bottom feet of the cover legs onto the bottom tray channel. Slowly release the cover to allow the cover to slide in place (see Figure 24).

SECTION 12

12.0 Initial Charge

Batteries lose some charge during shipment as well as during the period prior to installation. A battery should be installed and given its initial charge as soon after receipt as possible. Battery positive (+) terminal should be connected to charger positive (+) terminal and battery negative (-) terminal to charger negative (-) terminal. Failure to perform the initial charge within the limits stated in section 4 will affect the performance and life of the battery and may void the warranty.

12.1 Constant Voltage Method

Constant voltage is the only charging method allowed. Most modern chargers are of the constant voltage type.

Determine the maximum voltage that may be applied to the system equipment. This voltage, divided by the number of cells connected in series, will establish the maximum volts per cell (VPC) that is available.

Table B lists recommended voltages and charge times for the initial charge. Select the highest voltage the system allows to perform the initial charge in the shortest time period.

TABLE B

	INITIAL CHARGE (77°F)
CELL VOLTS	TIME-HRS(Minimum)
2.30	24
2.35	12

NOTE: Time periods listed in Table B are for 77°F. For other temperatures a compensation factor of .003 V/°F (.0055 V/°C) per cell is recommended. The minimum voltage is 2.20 VPC, temperature correction does not apply below this voltage.

V corrected = V25°C - ((T actual-25°C) x (.0055V/°C)) or
V corrected = V77°F - ((T actual-77°F) x (.003V/°F))

Raise the voltage to the maximum value permitted by the system equipment, without exceeding 2.35 VPC. **When charging current has tapered and stabilized (no further reduction for three hours), charge for the hours shown in the above table or until the lowest cell voltage ceases to rise.** To determine the lowest cell, monitoring should be performed during the final 10% of the charge time.

SECTION 13

13.0 Operation

13.0.1 Cycle Method of Operation

In cycle operation, the degree of discharge will vary for different applications. Therefore, the frequency of recharging and the amount of charge necessary will vary. The amount of charge necessary depends on the number of ampere hours discharged. Generally, Absolyte IIP cells require approximately 105-110% of the ampere-hours removed to be returned to a full state of charge.

The upper voltage settings recommended, given that the maxium charge current is 5% of the nominal C/100 Amp-hour rating and ambient temperatures of 25°C (77°F), are as follows:

2.28 ± 0.02 VPC @ 0-2% DOD
2.33 ± 0.02 VPC @ 3-5% DOD
2.38 ± 0.02 VPC @ >5% DOD

Due to the variety of applications and charging equipment (particularly in Photovoltaic systems) it is recommended that you contact a GNB representative when determining proper recharge profiles.

13.1 Floating Charge Method

In this type of operation, the battery is connected in parallel with a constant voltage charger and the critical load circuits. The charger should be capable of maintaining the required constant voltage at battery terminals and also supply a normal connected load where applicable. This sustains the battery in a fully charged condition and also makes it available to assume the emergency power requirements in the event of an AC power interruption or charger failure.

13.2 Float Charge - Float Voltages

Following are the float voltage ranges recommended for the Absolyte Battery System. Select any "volts per cell" (VPC) value within the range listed that will result in the series string having an average volts per cell equal to that value.

RECOMMENDED FLOAT VOLTAGES (77°F)
2.23 to 2.27 VPC

NOTE: Recommended float voltages are for 77°F. For other temperatures a compensation factor of .003 V/°F (.0055 V/°C) per cell is recommended. The minimum voltage is 2.20 VPC, temperature correction does not apply below this voltage. The

maximum voltage is 2.35 VPC, temperature correction does not apply above this voltage.

TEMPERATURE CORRECTION

V corrected = V25°C - ((T actual-25°C) x (.0055V/°C)) or
V corrected = V77°C - ((T actual-77°F) x (.003V/°F))

Modern constant voltage output charging equipment is recommended for the floating charger method of operation of GNB Absolyte batteries. This type of charger, properly adjusted to the recommended float voltages and following recommended surveillance procedures, will assist in obtaining consistent serviceability and optimum life.

After the battery has been given its initial charge (refer to Section 12), the charger should be adjusted to provide the recommended float voltages at the battery terminals.

Do not use float voltages higher or lower than those recommended. Reduced capacity or battery life will result.

Check and record battery terminal voltage on a regular basis. Monthly checks are recommended. See Section 16.0, Records, Item B. If battery float voltage is above or below the correct value, adjust charger to provide proper voltage as measured at the battery terminals.

13.3 Voltmeter Calibration

Panel and portable voltmeters used to indicate battery float voltages should be accurate at the operating voltage value. The same holds true for portable meters used to read individual cell voltages. These meters should be checked against a standard every six months and calibrated when necessary.

13.4 Recharge

All batteries should be recharged as soon as possible following a discharge with constant voltage chargers. However, to recharge in the shortest period of time, raise the charger output voltage to the highest value which the connected system will permit. Do not exceed the voltages and times listed in Table C, Section 14.2.

13.5 Determining State-of-Charge

If the normal connected load is constant (no emergency load connected), the following method can be used to determine the approximate state-of-charge of the battery. The state-of-charge can be identified of some degree by the amount of charging current going to the battery. When initially placed on charge or recharge following a discharge, the charging current, read at the charger ammeter, will be a combination of the load current plus the current necessary to charge the battery. The current to the battery will start to decrease and will finally stabilize when the battery becomes fully charged. If the current level remains constant for three consecutive hours, then this reflects a state-of-charge of approximately 95 to 98%. For most requirements, the battery is ready for use.

If the normal connected load is variable (i.e. telecommunications), the following method may be used to check the state-of-charge of the battery. Measure the voltage across a pilot cell (See Section 15.0 for definition of pilot cell). If the voltage is stable for 24 consecutive hours, the battery reflects a state of charge of approximately 95%.

13.6 Effects of Float Voltage

Float voltage has a direct effect on the service life of your battery and can be the cause of thermal instability.

A float voltage above the recommended values reduces service life. The chart below shows the effects of float voltage (temperature corrected) on battery life.

Temperature corrected 77°F (25°C) Float voltage per cell		Percent Reduction
Minimum	Maximum	in Battery Life
2.23	2.27	0%
2.28	2.32	50%
2.33	2.37	75%

Voltage records must be maintained by the user in accordance with the maintanence schedule published in this manual. To obtain the optimum service life from the battery, it is important to make sure the battery's float voltage is within the recommended range.

SECTION 14

14.0 Equalizing Charge

Under normal operating conditions an equalizing charge is not required. An equalizing charge is a special charge given a battery when non-uniformity in voltage has developed between cells. It is given to restore all cells to a fully charged condition. Use a charging voltage higher than the normal float voltage and for a specified number of hours, as determined by the voltage used.

Non-uniformity of cells may result from low float voltage due to improper adjustment of the charger or a panel voltmeter which reads an incorrect (higher) output voltage. Also, variations in cell temperatures greater than 5°F (2.78°C) in the series string at a given time, due to environmental conditions or module arrangement, can cause low cells.

14.1 Equalizing Frequency

An equalizing charge should be given when the following conditions exist:

A. The float voltage of any cell (as per Section 15.0) is less than 2.18 VPC.

B. A recharge of the battery is required in a minimum time period following an emergency discharge.

C. The float voltage range within a string is greater than 0.10 volts.

D. Accurate periodic records (See Section 16) of individual cell voltages show an increase in spread since the previous semi-annual readings.

14.2 Equalizing Charge Method

Constant voltage charging is the method for giving an equalizing charge. Determine the maximum voltage that may be applied to the system equipment. This voltage, divided by the number of cells connected in series, will establish the maximum volts per cell that may be used to perform the equalizing charge in the shortest period of time (not to exceed 2.35 VPC applicable at 77°F, 25°C). Refer to Table C for voltages and recommended time periods.

TABLE C

EQUALIZE CHARGE

CELL VOLTS	TIME (HOURS)
2.30	24
2.35	12

NOTE: Charge volts listed in Table C are for 77°F. For other temperatures a compensation factor of .003 V/°F (.0055 V/°C) per cell is recommended. The minimum voltage is 2.20 VPC. The maximum voltage is 2.35 VPC. Temperature correction does not apply outside of this range.

V corrected = V25°C - ((T actual-25°C) x (.0055 V/°C))or
V corrected = V77°F - ((T actual-77°F) x (.003 V/°F))

Raise the voltage to the maximum value permitted as described above. **When charging current has tapered and stabilized (no further reduction for three hours), charge for the hours shown in Table C or until the lowest cell voltage ceases to rise.** Monitoring of cell voltages should be started during the final 10% of the applicable time period to determine lowest cell in the battery.

SECTION 15

15.0 Pilot Cell

A pilot cell is selected in the series string to reflect the general condition of cells in the battery. The cell selected should be the lowest cell voltage in the series string following the initial charge. See Section 12.0 - Initial Charge. Reading and recording pilot cell voltage monthly serves as an indicator of battery condition between scheduled overall individual cell readings.

SECTION 16

16.0 Records

A complete recorded history of the battery operation is essential for obtaining satisfactory performance, and life. Good records will also show when corrective action may be required to eliminate possible charging, maintenance or environmental problems.

The following surveillance data must be read and permanently recorded for review by supervisory personnel so that any necessary remedial action is taken.

A. Upon completion of the initial charge and with the battery on float charge at the proper voltage for one week, read and record the following:
    1. Individual cell voltages
    2. Battery terminal voltages
    3. Ambient temperature
    4. Optional: Temperature of the negative terminal of each cell/unit of battery.
B. Every 12 months, a complete set of readings as specified in Paragraph A above must be done.
C. Whenever the battery is given an equalizing charge, an additional set of readings should be taken and recorded as specified in Paragraph A above.

The suggested frequency of record taking is the absolute minimum to protect warranty. For system protection and to suit local conditions or requirements, more frequent readings (monthly) are desirable. See Figure 25 for sample record form.

SECTION 17

17.0 Tap Connections

Tap connections should not be used on a battery. This can cause overcharging of the unused cells and undercharging of those cells supplying the load, thus reducing battery life.

SECTION 18

18.0 Temporary Non-Use

An installed battery that is expected to stand idle longer than the maximum storage interval (see Sec. 4.2), should be treated as stated below. The maximum storage interval is 6 months if stored at 77°F.

Give the battery an equalizing charge as per Section 14. Following the equalizing charge, open connections at the battery terminals to remove charger and load from the battery.

Repeat the above after every 6 months (77°F) or at the required storage interval. See Section 4.2 for adjustments to storage intervals when the storage temperature exceeds 77°F.

To return the battery to normal service, re-connect the battery to the charger and the load, give an equalizing charge and return the battery to float operation.

SECTION 19

19.0 Unit Cleaning

Periodically clean cell covers with a dry 2" paintbrush to remove accumulated dust. If any cell parts appear to be damp with electrolyte or show signs of corrosion, contact your local GNB representative.

CAUTION!

Do not clean plastic parts with solvents, detergents, oils, mineral spirit or spray type cleaners as these may cause crazing or cracking of the plastic materials.

GNB

INDUSTRIAL POWER

MATERIAL SAFETY DATA SHEET

A Division of EXIDE

I. Product Identification

Chemical/Trade Name (Identity used on label): ABSOLYTE IIP/CHAMPION Sealed Lead Acid Battery	Chemical Family/Classification: Electric Storage Battery
Company Name: Exide Technologies	Address: 829 Parkview Boulevard
Division or Department: GNB Industrial Power	Lombard, Illinois 60148-3249 800-872-0471

Contact:	Telephone Number:
Questions concerning MSDS	Mr. Richard Thompson (972) 335-2121 x40
Transportation Emergencies: CHEMTREC Within the United States - Toll-free: Outside the United States - Call collect:	24 hours: (800) 424-9300 (703) 527-3887

II. Hazardous Ingredients

MATERIAL	% by Weight	CAS NUMBER	Limits Exposure OSHA	Limits ACGIH
Lead	67-77	7439-92-1	0.05 mg/m^3	0.15 mg/m^3
Electrolyte: (Sulfuric Acid)	18-23	7664-93-9	1 mg/m^3	1 mg/m^3
Case Material: Polypropylene	2-5	9003-07-0	N/A	N/A
Separator	2-3	N/A	N/A	N/A
Copper	<1	7440-50-8	1 mg/m^3	N/A
Tin	<0.2	N/A	2 mg/m^3	N/A
Cadmium	0.2-0.3	7440-43-9	0.05 mg/m^3	0.05 mg/m^3
Antimony	0.2-0.4	7440-36-0	0.5 mg/m^3	0.5 mg/m^3

III. Physical Data

Materials (at normal temperatures): Electrolyte	Appearance and Odor: Electrolyte is a clear liquid with a sharp, penetrating, pungent odor.
Boiling Point (at 760 MM Hg): 203°F	Melting Point: N/A
Specific Gravity (H_2O=1): 1.230-1.350	Vapor Pressure (mm Hg at 20°C): 10
Vapor Density (AIR=1): Greater than 1	Solubility in Water: 100%
% Volatiles by Weight: N/A	Evaporation Rate (Butyl Acetate=1): Less than 1

IV. Health Hazard Information

Routes of Entry:

Sulfuric Acid: Under normal conditions of use, sulfuric acid vapors and mist are not generated. Sulfuric acid vapors and mist may be generated when product is overheated, oxidized, or otherwise processed or damaged.

Lead Compounds: Under normal conditions of use, lead dust, vapors, and fumes are not generated. Hazardous exposure may occur when product is overheated, oxidized, or otherwise processed or damaged to create dust, vapor, or fumes.

Inhalation:
Sulfuric Acid vapors or mist may cause severe respiratory irritation. Lead dust or fumes may cause irritation of upper respiratory tract or lungs.

Skin Contact:
Sulfuric Acid may cause severe irritation, burns and ulceration. Lead Compounds are not readily absorbed through the skin.

Skin Absorption:
Sulfuric Acid is not readily absorbed through the skin. Lead Compounds are not readily absorbed through the skin.

Eye Contact:
Sulfuric Acid vapors or mist can cause severe irritation, burns, cornea damage and possible blindness. Lead Compounds may cause eye irritation.

Ingestion:
Sulfuric Acid may cause severe irritation of mouth, throat, esophagus and stomach. Lead Compounds may cause abdominal pain, nausea, vomiting, diarrhea and severe cramping. Acute ingestion should be treated by physician.

SIGNS AND SYMPTOMS OF OVEREXPOSURE

Acute Effects:
Sulfuric Acid may cause severe skin irritation, burns, damage to cornea and possible blindness and upper respiratory irritation. Lead Compounds may cause abdominal pain, nausea, headaches, vomiting, diarrhea, severe cramping and difficulty in sleeping.

Chronic Effects:
Sulfuric Acid may lead to scarring of the cornea, inflammation of the nose, throat and bronchial tubes and possible erosion of tooth enamel.
Lead Compounds may cause anemia, damage to the kidneys and nervous system. May cause reproductive harm in both males and females.

POTENTIAL TO CAUSE CANCER

Lead Compounds - Human studies are inconclusive regarding lead exposure and an increased cancer risk. The EPA and the International Agency for Research on Cancer (IARC) have categorized lead and inorganic lead compounds as a B2 classification (probable/possible human carcinogen) based on sufficient animal evidence and inadequate human evidence.

EMERGENCY AND FIRST AID PROCEDURES

Inhalation:
Sulfuric Acid - Remove to fresh air immediately. If breathing is difficult, give oxygen.
Lead Compounds - Remove from exposure; gargle, wash nose and eyes and consult physician.

Skin:
Sulfuric Acid - flush with large amounts of water for at least 15 minutes, remove any contaminated clothing and do not wear again until cleaned. If acid is splashed on shoes, remove and discard if they contain leather. Lead Compounds are not readily absorbed through the skin.

Eyes:
Sulfuric Acid - flush immediately with cool water for at least 15 minutes, then consult physician.
Lead Compounds - flush immediately with cool water for at least 15 minutes, then consult physician.

Ingestion:
Sulfuric Acid - give large quantities of water; **DO NOT** induce vomiting, then consult physician.
Lead Compounds - consult a physician.

V. Fire and Explosion Data

Flash Point:	Flammable Limits:
Not applicable.	Lower 4.1% (Hydrogen gas) Upper 74.1%

Extinguishing Media:
Carbon dioxide (CO_2); foam; dry chemical.

Special Fire Fighting Procedures:
If batteries on charge, turn off power. Use positive pressure, self-contained breathing apparatus. Water applied to electrolyte generates heat and causes it to splatter. Wear acid resistant clothing.

Unusual Fire and Explosion Hazard:
Hydrogen and oxygen gases are produced in the cells during normal battery operation or when on charge (hydrogen is highly flammable and oxygen supports combustion). These gases enter the air through the vent caps. To avoid risk of fire or explosion, keep sparks and other sources of ignition away from the battery, and ensure that adequate ventilation is provided. Do not allow metallic material to simultaneously contact both the positive and negative terminal of batteries. Follow manufacturers' instructions for installation and operation.

VI. Reactivity Data

Stability:
☐ = Unstable ■ = Stable

Conditions to Avoid:
Sparks and other sources of ignition.
Prolonged overcharge and overheating.

Incompatibility (Material to Avoid):
Combination of sulfuric acid with combustibles, and organic materials may cause fire and explosion. Also avoid strong reducing agents, most metals, carbides, chlorates, nitrates, and picrate.
Lead Compound: Potassium, carbides, sulfides, peroxides, phosphorus and sulfur.

Hazardous Decomposition Products:
Sulfuric Acid: Hydrogen, sulfur dioxide, sulfur trioxide, hydrogen sulfide, and sulfuric acid mist.

Hazardous Polymerization:
☐ = May Occur ■ = Will Not Occur

VII: Control Measures

Engineering Controls:
Store and handle lead acid batteries in well ventilated areas.

Work Practices:
Make certain vent caps are on tightly. Follow all manufacturers' recommendations when stacking or palletizing. Do not allow metallic materials to simultaneously contact both the positive and negative terminals of the batteries. Use a battery carrier to lift a battery or place hands at opposite corners to avoid spilling acid through the vents. Avoid contact with internal components of the batteries.

PERSONAL PROTECTIVE EQUIPMENT

Respiratory Protection:
None are required under normal conditions. If an overcharge or overheating condition exists and concentrations of sulfuric acid mist are known or suspected to exceed PEL, use NIOSH or MSHA approved respiratory protection.

Eyes and Face:
None are required under normal conditions. If electrolyte is exposed due to damage to the cell, wear chemical splash goggles or a face shield.

Hands, Arm, Body:
None are required under normal conditions. If electrolyte is exposed due to damage to the cell, wear rubber or plastic acid resistant gloves with elbow length gauntlet.

Other Special Clothing and Equipment:
None under normal conditions. If electrolyte is exposed due to damage to the cell, wear an acid resistant apron.

VIII. Safe Handling Precautions

Hygiene Practices:
Wash hands thoroughly before eating, drinking or smoking after handling batteries.
Protective Measures to be taken during non-routine tasks including equipment maintenance:
Charged batteries can present an electrical hazard. Take all appropriate precautions.

Protective Measures to be taken during non-routine tasks including equipment maintenance:
Not applicable.

SPILL OR LEAK PROCEDURES

Protective measures to be taken if material is released or spilled:
Remove combustible materials and all sources of ignition. Carefully neutralize spill with soda ash, etc. Make certain mixture is neutral then collect residue and place in a drum or other suitable container with a label specifying "contains hazardous waste" or (if uncertain call distributor regarding proper labeling procedures). Dispose of as hazardous waste. If battery is leaking, place battery in a heavy duty plastic bag. Wear acid resistant boots, faceshield, chemical splash goggles and acid resistant gloves.
DO NOT RELEASE UNNEUTRALIZED ACID.

Waste Disposal Methods:
Sulfuric Acid: Neutralize as described above for a spill, collect residue and place in a container labeled as containing hazardous waste. Dispose of as a hazardous waste. If uncertain about labeling procedures, call your local battery distributor or listed contact.

DO NOT FLUSH LEAD CONTAMINATED ACID TO SEWER.

Batteries: Send to lead smelter following applicable federal, state and local regulations.

IX. Other

REGULATORY INFORMATION:
NFPA Hazard rating for Sulfuric Acid:
Flammability (Red) = 0 Health (Blue) = 3 Reactivity (Yellow) = 2

US DOT identification and description for this battery is:
Batteries, wet, non-spillable, 8, UN 2800, PG III
Label: Corrosive
(Exceptions 173.159, paragraph (d), C.F.R. 49)
For air shipments, see International Air Transportation Association (IATA) Dangerous Goods Regulations Manual, special provisions A-48 and A-67. For ocean shipments, reference International Maritime Dangerous Goods Code, P. 8121.

This is to certify that the "Non-Spillable" batteries are capable of withstanding the Vibration and Pressure Differential Test, and at a temperature of 55°C, the electrolyte will not flow from a ruptured or cracked case. The batteries have been protected against short circuits and securely packaged. The batteries and outer packaging must be plainly marked "Non-Spillable" or "Non-Spillable Battery".

PROPOSITION 65 WARNING
Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

The National Toxicology Program (NTP) and the International Agency for Research on Cancer (IARC) have classified "strong inorganic acid mist containing sulfuric acid" as a substance that is carcinogenic to humans. This classification does not apply to liquid forms of sulfuric acid or sulfuric acid solutions contained within a battery. Inorganic acid mist (sulfuric acid mist) is not generated under normal use of this product. Misuse of the product, such as overcharging, may however result in the generation of sulfuric acid mist.

This product contains sulfuric acid (CAS #7664-93-9), an extremely hazardous substance (40 CFR 355.30), that may be subject to the reporting requirements of Sections 302/304, 311/312 and Section 313 (only acid aerosols including mists, vapors, gas, fog, and other airborne forms) of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and 40 CFR Parts 355, 370 and 372 (Community Right-to-Know).

This product contains lead (CAS #7439-92-1) and lead compounds, chemicals that may be subject to the reporting requirements of Sections 311/312 and Section 313 of SARA, and 40 CFR Parts 370 and 372 (Community Right-to-Know).

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