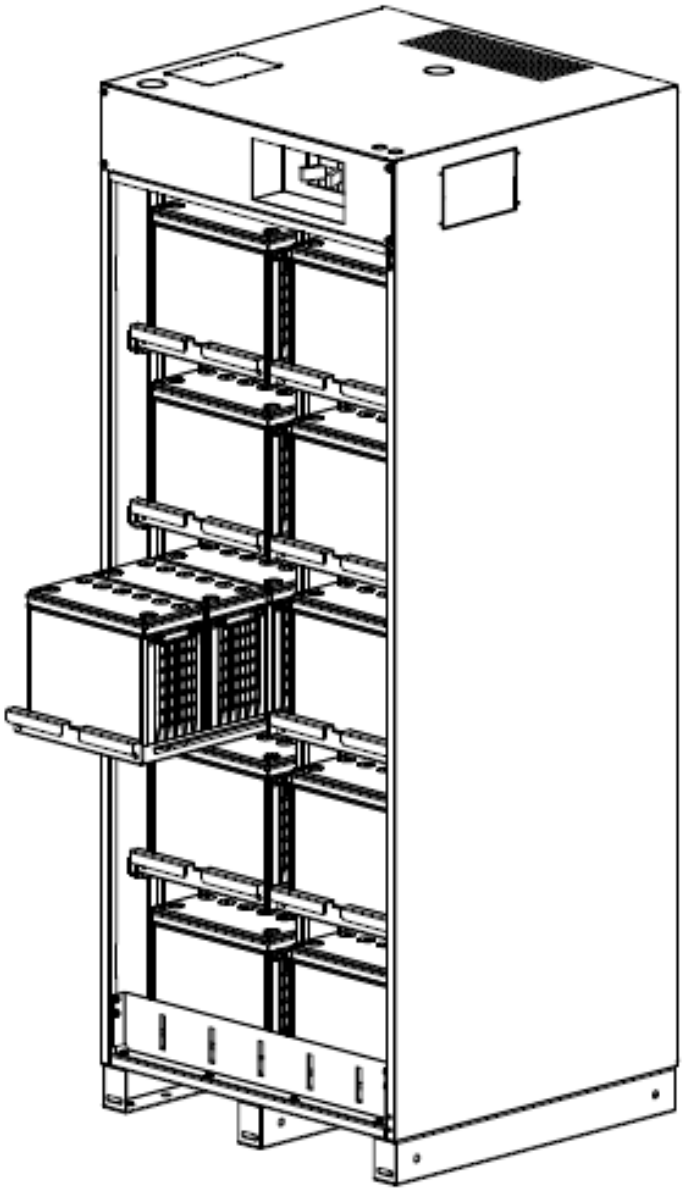
Full-Sized legible color report must be on site and made available by the Permittee for all inspections.

PRCTI20240333, Rev.1

Cerio Project

TBC48 Battery Cabinet with 12XE1040-FR Batteries



City of Puyallup
Building
REVIEWED
FOR
COMPLIANCE
BSnowden
10/15/2025
1:33:04 PM

C&C POWER
ENGINEERED POWER PRODUCTS

UL Product iQ®

Model TBC48

File Number: E212683

COMPANY

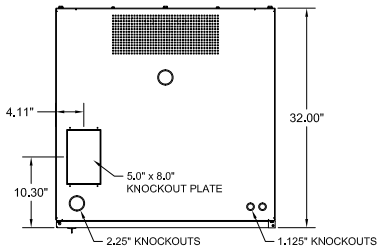
C&C POWER INC
395 MISSION ST
CAROL STREAM, IL 60188-9413 United States

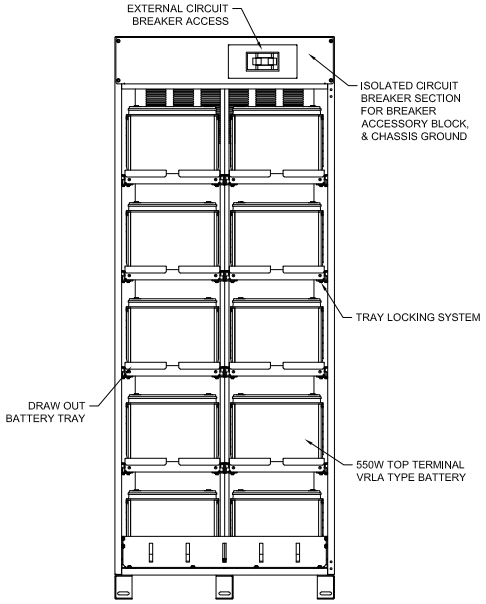
MODEL INFO

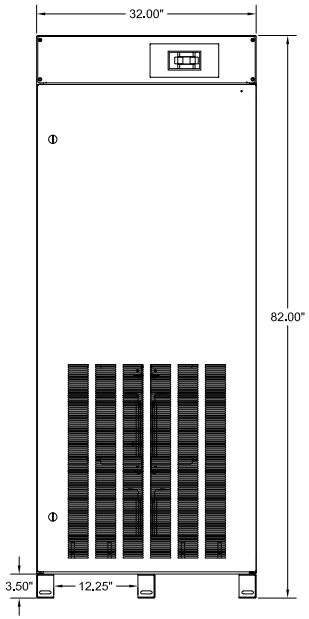
TBC48

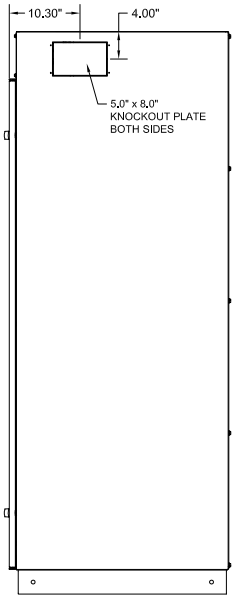
UPS EQUIPMENT	VALUE
US Standards	UL 1778 5th Edition
Canadian Standards	CSA C22.2 No. 107.3-14 3rd edition

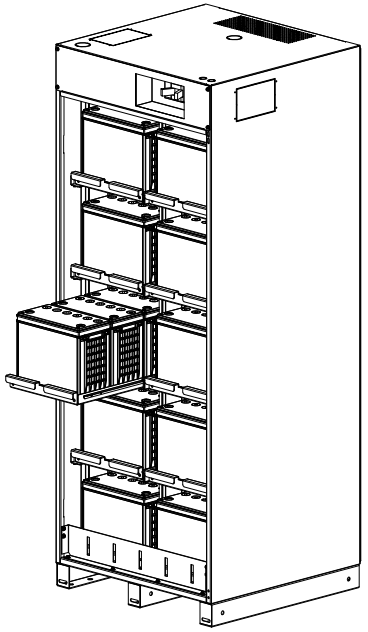
Report Date: 2025-08-11
Revision Date: 2025-08-27

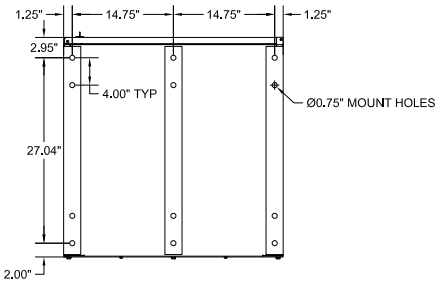












NOTES:
EMPTY CABINET WEIGHT: 488 LBS

1. NEMA 1 ENCLOSED BATTERY CABINET.
2. FACTORY ASSEMBLED CABINETS ARE LISTED TO UL 1778.
3. HEAVY GAUGE WELDED STEEL CONSTRUCTION.
4. AVAILABLE IN MULTIPLE COLORS OF DURABLE CHIP AND CORROSION RESISTANT POWDER COAT FINISH.
5. A MINIMUM REAR CLEARANCE OF 2" IS RECOMMENDED FOR OPTIMAL COOLING OF THE EQUIPMENT.
6. FOR EASE OF CONDUIT INSTALLATION, (1) 5" X 8" CONDUIT PLATE IS PROVIDED TO REPLACE A KNOCKOUT IN THE CABINET.
7. BATTERIES CAN BE ACCESSED FROM THE FRONT AND REAR.
8. CABINET CAN BE MOVED WITH PALLET JACK OR FORK LIFT AT PALLET JACK ACCESS POINTS LOCATED AT FRONT OR REAR OF CABINET. FROM THE SIDES, THE CABINET CAN BE MOVED WITH ROL-A-LIFT TYPE EQUIPMENT MOVER. THE CABINET IS ONLY TO BE LIFTED FROM THE BOTTOM.
9. THE BC48S BATTERY CABINET (OPTIONAL CONFIGURATION) IS CERTIFIED TO THE INTERNATIONAL BUILDING CODE (IBC) AND THE CALIFORNIA BUILDING CODE (CBC) TO MEET SEISMIC DESIGN CATEGORY F, SS = 2.0 AND IMPORTANCE FACTOR 1.5.

DRAWING #: 91448-SDC01-1 REV 2

TBC48 BATTERY CABINET
MECHANICAL DRAWING

DIMENSIONS ARE IN INCHES	INITIALS	DATE
TOLERANCES:		
DECIMALS: .XX ±.13 .XXX ±.062 ANGLES: ±1°	DRAWN JRL	03/21/2022
	CHECKED CH	03/21/2022

SCALE:	SIZE:	REV:	
NTS	A	2	SHEET 1 OF 2

C&C POWER
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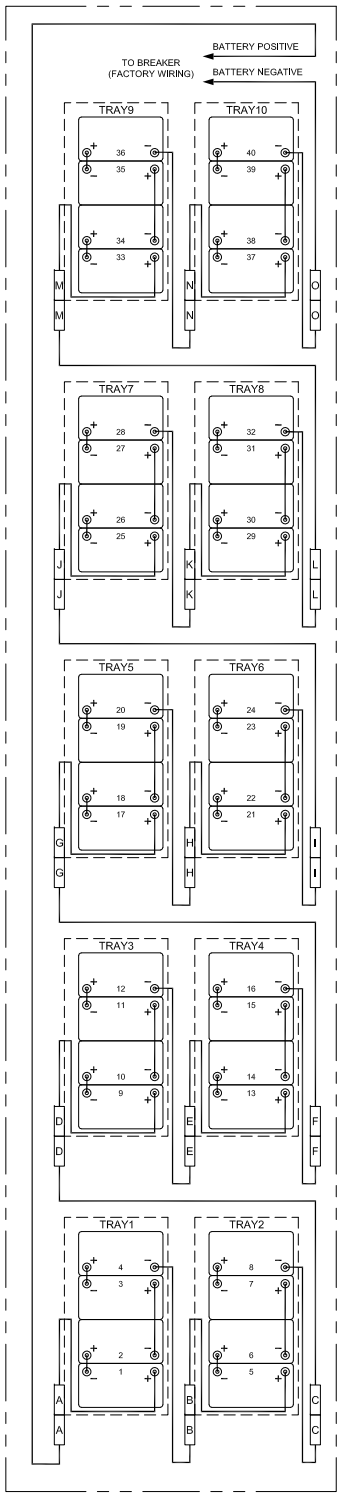
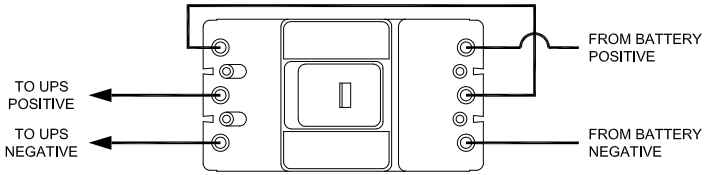
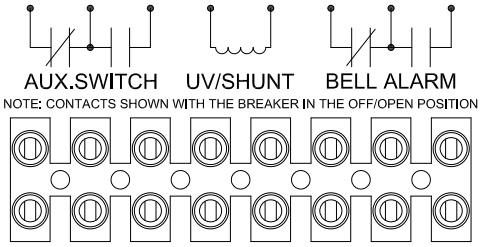
TYPICAL BATTERY WIRING



BREAKER





NOTE: CONTACTS SHOWN WITH THE BREAKER IN THE OFF/OPEN POSITION

MULTIPLE BREAKER ACCESSORY COMBINATIONS AVAILABLE.

NOTES:
1. ALL INTERNAL WIRING IS UL LISTED, MTW, STYLE, 105C, EXTRA FLEXIBLE CABLE.
2. BREAKER IS UL LISTED.
3. CABINETS WITH BREAKERS ARE SHIPPED WITH BREAKER IN THE OFF/OPEN POSITION.
4. CABINETS ARE SHIPPED WITH BATTERY JUMPER REMOVED TO BREAK STRING VOLTAGE FOR ADDED SAFETY IN SHIPPING.
5. THE TERMINAL BLOCKS ARE UL RECOGNIZED, 600V RATED.
6. CABLES FROM BATTERY CABINET TO UPS SYSTEM ARE OPTIONAL.
7. GROUND CONNECTION IS #14-1/0 AWG MECHANICAL LUG.

TBC48 BATTERY CABINET
ELECTRICAL DRAWING

DIMENSIONS ARE IN INCHES	INITIALS	DATE
TOLERANCES:		
DECIMALS: .XX ±.13 .XXX ±.062 ANGLES: ±1°	DRAWN JRL	03/18/2022
	CHECKED CH	03/18/2022

SCALE:	SIZE:	REV:	
NTS	A	1	SHEET 2 OF 2

C&C POWER
ENGINEERED POWER PRODUCTS
WWW.CCPOWER.COM

DRAWING #: 91448-SDC01-2 REV 1

System Runtime Estimator Report

Customer Name:	C&C Power, Inc.	**Prepared by:**	Paul Blake
Location:	Elmhurst, IL	**Phone:**	630-617-9022
Project:		**Date:**	10/2/25
Email:	paul@ccpower.com		

Load Details

Load Value (KW):	1250.000
Power Factor:	N/A
Efficiency:	96.5%
Number of Cells:	240
Number of Strings:	6
Min. Voltage (Vpc):	1.67

Battery Parameters

Battery Chemistry:	Lead Acid
Battery Range:	DataSafe XE
Battery Model:	12XE1040-FR
Technology:	VRLA - AGM
Lowest Temp (°F):	77.0

Runtime Results :

Estimated Beginning of Life Runtime (BOL) is 00:06:45 [hh:mm:ss]

Estimated End of Life Runtime (EOL) is 00:04:09 [hh:mm:ss]

Note: Runtime calculation results represent average cell performance and should be used for estimates only
End of Life assumes a 20% loss in capacity and may result in more than a 20% loss in runtime

Notes:
1.Results represent average cell performance and should be used for estimates only
2.End of Life assumes a 20% loss in capacity and may result in more than a 20% loss in runtime
3.Results represent average system performance at 100% state of charge.
4.BOL results represent 100% battery capacity. EOL results represent 80% battery capacity.
5.Adding cable losses increases the accuracy of results.
6.Results are not a guarantee of system performance.

System Runtime Estimator Report

Customer Name:	C&C Power, Inc.	**Prepared by:**	Paul Blake
Location:	Elmhurst, IL	**Phone:**	630-617-9022
Project:		**Date:**	10/2/25
Email:	paul@ccpower.com		

Load Details

Load Value (KW):	1000.000
Power Factor:	N/A
Efficiency:	96.5%
Number of Cells:	240
Number of Strings:	5
Min. Voltage (Vpc):	1.67

Battery Parameters

Battery Chemistry:	Lead Acid
Battery Range:	DataSafe XE
Battery Model:	12XE1040-FR
Technology:	VRLA - AGM
Lowest Temp (°F):	77.0

Runtime Results :

Estimated Beginning of Life Runtime (BOL) is 00:07:16 [hh:mm:ss]

Estimated End of Life Runtime (EOL) is 00:04:36 [hh:mm:ss]

Note: Runtime calculation results represent average cell performance and should be used for estimates only
End of Life assumes a 20% loss in capacity and may result in more than a 20% loss in runtime

Notes:
1.Results represent average cell performance and should be used for estimates only
2.End of Life assumes a 20% loss in capacity and may result in more than a 20% loss in runtime
3.Results represent average system performance at 100% state of charge.
4.BOL results represent 100% battery capacity. EOL results represent 80% battery capacity.
5.Adding cable losses increases the accuracy of results.
6.Results are not a guarantee of system performance.

data safe XE

Battery
Range Summary

The EnerSys® DataSafe® XE range of front and top terminal batteries has been developed to meet the challenging demands of the modern UPS market sector. Conventional Uninterruptible Power Supply (UPS) batteries that historically focused on a 15 minute rate discharge have become increasingly ineffective in fulfilling the growing need for sub five minute autonomies. Furthermore, the pressure to lower energy costs by minimizing air conditioning in equipment rooms results in a trend towards higher operating temperatures.

To meet these requirements, EnerSys has optimized its world-renowned, advanced Thin Plate Pure Lead (TPPL) technology to deliver five monoblocs, with outstanding features and benefits. Unlike typical Valve Regulated Lead Acid (VRLA) batteries, DataSafe front terminal 12XE1010F-FR, 12XE1110F-FR, 12XE1150F-FR and the top terminal 12XE760-FR and 12XE1040-FR monoblocs provide the perfect solution to the ever-evolving requirements of today's data center world.

Features and Benefits

- 764, 1010, 1040, 1109 and 1150 Watts per cell sizes (five minute rate to 1.67 Vpc)
- Specifically designed for five minutes or less high-rate discharge applications
- Pure lead technology for longer life at elevated temperatures
- 12 year design life at 77°F (25°C)
- Up to 17 months shelf life at 77°F (25°C) for maximum flexibility in project deployment
- Outstanding power density in industry-standard footprints at 77°F (25°C)
- Fast recharge times to support multiple outages
- Lower energy consumption compared to traditional VRLA AGM batteries
- Front terminal design for ease of installation and maintenance
- Top terminal design for upgrades to existing applications

EnerSys®
Power/Full Solutions

Visit us at **www.enersys.com**

Construction

- High performance TPPL grids for optimized corrosion resistance at high operating temperatures
- Active material specifically engineered for maximum performance at sub five minute discharge rates
- Enhanced internal connections designed for high rate UPS loads
- Superior quality microporous glass mat separator with high absorption and stability
- Containers and lids in UL94 V-0 rated flame retardant material, highly resistant to shock and vibration
- High grade sulphuric acid electrolyte absorbed into separator material
- High integrity leak resistant dual-seal terminal design
- Self-regulating pressure relief valves prevent ingress of oxygen
- Flame arrestors built into each bloc for increased operational safety
- Robust handles for ease of handling

Installation and Operation

- Monoblocs are designed for installation in cabinets or on racks, close to the point of use. A separate battery room is not necessary
- It is recommended that DataSafe® XE blocs are installed upright
- Recommended float charge voltage: 2.27Vpc at 77°F (25°C) 2.29Vpc at 68°F (20°C)
- Low maintenance: no water addition required
- Wide operating temperature range: -40°F (-40°C) to 122°F (50°C)
- Front terminal connection torque: 9Nm – 80 lbf in; Top terminal connection torque: 6.8Nm – 60 lbf in

Standards

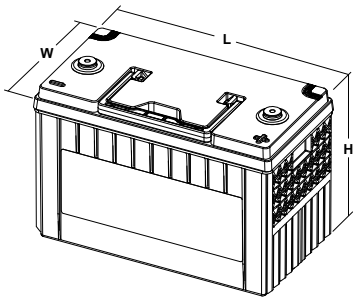
- Designed to be compliant with the requirements of international standard IEC 60896-21/22
- UL recognized component
- Classified as non-spillable and approved as non-hazardous cargo for ground, sea and air transportation in accordance with the requirements of International Maritime code for Dangerous Goods (IMDG) and International Civil Aviation Organization (ICAO)
- The management systems governing the manufacture of DataSafe XE batteries are ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007* certified

** OHSAS 18001:2007 certification not applicable to 12XE760F-FR*

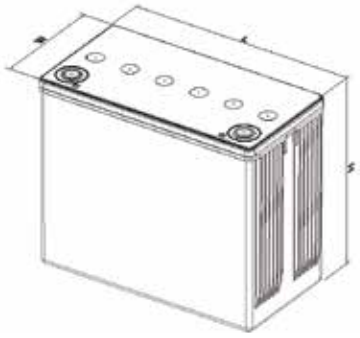
General Specifications

Type	Nominal Voltage (V)	Watts/Cell (Wpc)		Nominal Capacity (Ah)		Nominal Dimensions						Typical Weight		Short Circuit Current (A)	Internal Resistance (mΩ)[1]	Terminals
		5min/1.67Vpc 77°F/25°C	15min/1.67Vpc 77°F/25°C	C10/1.80Vpc 68°F/20°C	C10/1.80Vpc 68°F/20°C	Length		Width		Overall Height						
						in	mm	in	mm	in	mm	lbs	kg			
12XE760-FR	12	764	390	92	93	13.0	330	6.8	173	8.6	218	77.4	35.1	3100	4.0	M6 female
12XE1040-FR	12	1040	560	124	129	13.3	338	6.8	125	10.8	273	97.0	44.0	4150	3.3	M6 female
12XE1010F-FR	12	1010	566	155	158	22.9	581	4.9	125	11.1	283	107.4	48.7	3498	3.6	M6 male
12XE1110F-FR	12	1109	649	165	167	22.9	581	4.9	125	11.1	283	114.0	51.7	3916	3.2	M6 male
12XE1150F-FR	12	1150	706	180	181	22.9	581	4.9	125	12.4	316	129.2	58.6	4081	3.1	M6 male

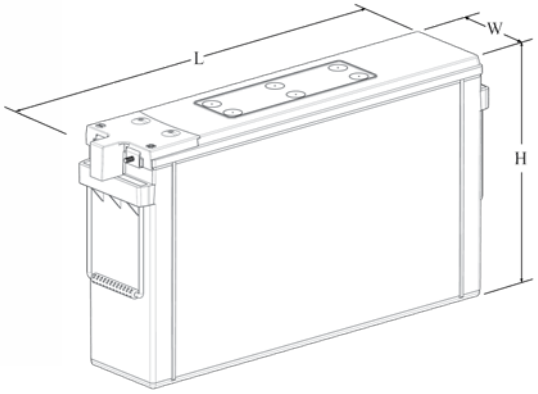
Note:
1 Figures obtained via IEC method.



12XE760-FR



12XE1040-FR



12XE1010F-FR
12XE1110F-FR
12XE1150F-FR

AM-DS12XE-RS AA April 2018

EnerSys
Power/Full Solutions

EnerSys World Headquarters
2366 Bernville Road
Reading, PA 19605, USA
Tel: +1-610-208-1991 /
+1-800-538-3627

EnerSys EMEA
EH Europe GmbH
Baarerstrasse 18
6300 Zug, Switzerland

EnerSys Asia
152 Beach Road
Gateway East Building #11-03
Singapore 189721
Tel:+65 6508 1780

Certificate of Compliance

Certificate: 80144181 **Master Contract:** 300975

Project: 80144181 **Date Issued:** 2024-04-24

Issued To: **Enersys**
2366 Bernville Rd.
Reading, Pennsylvania, 19605
United States

Attention: Creighton Brown

The products listed below are eligible to bear the CSA Mark shown with adjacent indicator 'US'

Issued by: Matt McKay

US

PRODUCTS

CLASS - C370182 - BATTERIES Battery System for use in Stationary Applications - Certified to US Standards

Family of Rechargeable Valve Regulated Lead Acid Monobloc Battery for Use in Stationary Applications.

Electrical Ratings (DataSafe HX and XE Families):

Monobloc Battery Model	Monobloc Battery Rating			
	Nominal Voltage, Vdc	Labeled Capacity, @15min rate to 1.67V/cell at 25°C, W/cell	8-Hour Rated Capacity to 1.75V/cell, Ah	Battery Pack configuration
12HX205-FR	12	206	43	6S-1P
12HX300-FR	12	284	71	6S-1P
12HX330-FR	12	336	83	6S-1P

12HX400-FR	12	381	94	6S-1P
12HX505-FR	12	506	119	6S-1P
12HX540-FR	12	540	123	6S-1P
12HX680F-FR	12	680	174.4	6S-1P
12HX1000F-FR	12	1000	240	6S-1P
Monobloc Battery Model	**Nominal Voltage, Vdc**	**Labeled Capacity, @15min rate to 1.67V/cell at 25°C, W/cell**	**10-Hour Rated Capacity to 1.67V/cell, Ah**	**Battery Pack configuration**
XE30	12	127.83	28	6S-1P
XE40	12	180.83	42	6S-1P
XE60	12	274.03	62	6S-1P
XE70	12	305.50	68	6S-1P
XE95	12	413.67	95	6S-1P
12XE760-FR	12	390	93	6S-1P
12XE1040-FR	12	560	129	6S-1P
12XE1010F-FR	12	566	158	6S-1P
12XE1110F-FR	12	649	167	6S-1P
12XE1150F-FR	12	705	181	6S-1P

Manufacturer's Specified Charging Parameters for Battery System (DataSafe HX and XE Families):

Monobloc Battery Model	**Temperature Range, °C**	**Nominal Float Voltage, Vdc**	**Nominal Charging Current, A**	**Max Equalize Voltage, Vdc**	**Maximum Charging Current, A**
12HX205-FR	-30°C to 50°C	13.62	0.1C	14.4	11.0
12HX300-FR	-30°C to 50°C	13.62	0.1C	14.4	18.0
12HX330-FR	-30°C to 50°C	13.62	0.1C	14.4	21.0
12HX400-FR	-30°C to 50°C	13.62	0.1C	14.4	24.0
12HX505-FR	-30°C to 50°C	13.62	0.1C	14.4	30.0
12HX540-FR	-30°C to 50°C	13.62	0.1C	14.4	31.0
12HX680F-FR	20°C to 25°C	13.62	0.1C	14.4	45
12HX1000F-FR	-30°C to 50°C	13.62	0.1C	14.4	60
XE30	-40°C to 80°C	13.62	0.1C	14.4	7.0
XE40	-40°C to 80°C	13.62	0.1C	14.4	10.5
XE60	-40°C to 80°C	13.62	0.1C	14.4	15.5
XE70	-40°C to 80°C	13.62	0.1C	14.4	17.0
XE95	-40°C to 80°C	13.62	0.1C	14.4	23.75
12XE760-FR	-40°C to 50°C	13.62	0.1C	14.4	23.25
12XE1040-FR	-40°C to 50°C	13.62	0.1C	14.4	32.25
12XE1010F-FR	-40°C to 50°C	13.62	0.1C	14.4	39.5
12XE1110F-FR	-40°C to 50°C	13.62	0.1C	14.4	41.75
12XE1150F-FR	-40°C to 50°C	13.62	0.1C	14.4	45.25

Manufacturer's Specified Discharging Parameters for Battery System (DataSafe HX and XE Families):

Monobloc Battery Model	Temperature Range, °C	Normal End of Discharge Voltage, Vdc	Maximum Discharging Power @5min to 1.60Vpc, W/cell	Lowest End of Discharging Voltage, Vdc
12HX205-FR	-30°C to 50°C	9.60	433	9.60
12HX300-FR	-30°C to 50°C	9.60	571	9.60
12HX330-FR	-30°C to 50°C	9.60	652	9.60
12HX400-FR	-30°C to 50°C	9.60	739	9.60
12HX505-FR	-30°C to 50°C	9.60	941	9.60
12HX540-FR	-30°C to 50°C	9.60	995	9.60
12HX680F-FR	20°C to 25°C	9.60	1261	9.60
12HX1000F-FR	-30°C to 50°C	9.60	1608	9.60
Monobloc Battery Model	**Temperature Range, °C**	**Normal End of Discharge Voltage, Vdc**	**Maximum Discharging Power @5min to 1.67Vpc , W/cell**	**Lowest End of Discharging Voltage, Vdc**
XE30	-40°C to 80°C	9.60	142.8	9.60
XE40	-40°C to 80°C	9.60	199.1	9.60
XE60	-40°C to 80°C	9.60	304.4	9.60
XE70	-40°C to 80°C	9.60	337.6	9.60
XE95	-40°C to 80°C	9.60	449.5	9.60
Monobloc Battery Model	**Temperature Range, °C**	**Normal End of Discharge Voltage, Vdc**	**Maximum Discharging Power @>1min to 1.50Vpc, W/cell**	**Lowest End of Discharging Voltage, Vdc**
12XE760-FR	-40°C to 50°C	9.60	1612	9.60
12XE1040-FR	-40°C to 50°C	9.60	1612	9.60
12XE1010F-FR	-40°C to 50°C	9.60	1496	9.60
12XE1110F-FR	-40°C to 50°C	9.60	1528	9.60
12XE1150F-FR	-40°C to 50°C	9.60	1588	9.60

Other Ratings (DataSafe HX and XE Families):

Monobloc Battery Model	Mass, kg	Maximum Short Circuit Current, A	Minimum Wall Separation Distance, mm	Minimum Clearance Between Batteries, mm
12HX205-FR	3.44	2775	2	1
12HX300-FR	5.45	3175	2	1
12HX330-FR	6.14	3700	2	1
12HX400-FR	6.53	4225	2	1
12HX505-FR	8.15	4510	2	1
12HX540-FR	8.35	4775	2	1
12HX680F-FR	67.1	5960	2	1

12HX1000F-FR	88.9	6903	2	1
XE30	10.2	2400	2	1
XE40	16.1	2600	2	1
XE60	22.4	3100	2	1
XE70	25.7	3500	2	1
XE95	35.1	5000	2	1
12XE760-FR	35.1	3100	2	1
12XE1040-FR	44.0	4150	2	1
12XE1010F-FR	48.7	3498	2	1
12XE1110F-FR	51.7	3916	2	1
12XE1150F-FR	58.6	4081	2	1

Conditions of Acceptability:

1. The multicell monobloc valve-regulated lead acid battery shall be used within the manufacturer's specified charging and discharging parameters and temperature ranges as noted in the PRODUCTS section.
2. The suitability of this multicell monobloc valve-regulated lead acid battery for use in series or parallel configurations shall be determined during the end use application evaluation.
3. The representative multicell monobloc valve-regulated lead acid batteries have also been subjected to an Overcharge Test. Test limit parameters for the Overcharge Test are outlined below.

Monobloc Battery Model	**Duration, HH:MM**	**Maximum Charging Voltage, Vdc**
12HX1000F-FR	07:00	15.001
12XE1150F-FR	07:00	15.001

4. Off-gassing from the multicell monobloc valve-regulated lead acid battery's pressure relief valve during normal operation shall be assessed during the end product evaluation for appropriate ventilation requirements.
5. Lowest end of discharge voltage is self-declared by manufacturer. Overdischarge test performed discharging the representative batteries to 1.57V/cell using the 8-hour rate discharge rate of 1.75V/cell. Any use below this limit shall be assessed during the end product evaluation.

APPLICABLE REQUIREMENTS

ANSI/CAN/UL-1973:2022	Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications, Third Edition Dated February 25, 2022

MARKINGS

See Descriptive Report.

Certificate: 80144181
Project: 80144181

Master Contract: 300975
Date Issued: 2024-04-24

Notes:

Products certified under Class(es) C370182 have been certified under CSA's ISO/IEC 17065 accreditation with the Standards Council of Canada (SCC). www.scc.ca

Supplement to Certificate of Compliance

Certificate: 80144181 **Master Contract:** 300975

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description
80144181	2024-04-24	Evaluation of DataSafe XE and DataSafe HX battery families to UL 1973 - Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications, Annex H Alternative Approach for Evaluating Valve Regulated or Vented Lead Acid or Nickel Cadmium Batteries.

EnerSys DataSafe 12XE Hydrogen Evolution Rates

Valve Regulated Lead-Acid (VRLA) batteries recombine a majority of the hydrogen produced under normal constant voltage charging conditions. VRLA batteries charged with constant current will vent excessive amounts of hydrogen equal to 454 ml/Hr per cell per ampere of charge current. In these charging conditions the amount of hydrogen produced is independent of cell size because the current is the limiting factor in how much gas will be produced. Because of the low percentage of hydrogen released EnerSys VRLA batteries are qualified to be used in an office environment with adequate ventilation for human occupancy. The batteries are considered non-hazardous because of the low amounts of hydrogen released and for being non-spillable types.

To ensure the battery room remains in a non-hazardous condition EnerSys recommends installing a hydrogen gas detector (EnerSys Pro Alarm - P/N 801550). This alarm will monitor the hydrogen emitted by the batteries, and provide warnings before explosive levels are reached. At 1% concentration of hydrogen a relay is energized. This relay may be attached to a ventilation fan that will exhaust the hydrogen and bring it back to a safe level. If the room should reach a 2% concentration of hydrogen a pulsating alarm will sound.

Battery Model	Amp-hr Rating 8hr to 1.75Vpc	Hydrogen Evolution Rate per Battery			
		Float - 2.27 VPC		Boost - 2.40 VPC	
		CFM	ml/hour	CFM	ml/hour
12XE760-FR	93	2.08E-06	3.54	1.11E-05	18.79
12XE-1040-FR	129	2.89E-06	4.91	1.53E-05	26.06
12XE1010F-FR	158	3.54E-06	6.02	1.88E-05	31.92
12XE1110F-FR	167	3.74E-06	6.36	1.99E-05	33.74
12XE1150F-FR	181	4.06E-06	6.89	2.15E-05	36.57

Notes:

1. The nominal AH capacity is based on the 8 hour rate to 1.75 Vpc final voltage at 77°F (25°C)
2. The hydrogen evolution rates calculated above are based on an ambient temperature of 77°F (25°C).
3. The hydrogen evolution rate doubles for every 18°F (10°C) rise above the nominal temperature.
4. The hydrogen evolution rate halves for every 18°F (10°C) below the nominal temperature.
5. All values represent typical product characteristics and are subject to change without notice.

Applications Engineering

EnerSys
http://www.EnerSys.com
2366 Bernville Road - Reading, PA 19605
1-800-538-3627

5/23/2018

EnerSys DataSafe 12XE Front Terminal Lead and Acid Weights

Battery Model	Amp-hr Rating 8hr to 1.75Vpc	Unit Weight		Lead Weight		Electrolyte (1.330 SG)				Acid (H_2SO_4)			
						Volume		Weight		Volume		Weight	
		lbs.	kg	lbs.	kg	gal.	liters	lbs.	kg	gal.	liters	lbs.	kg
12XE760-FR	93	77.4	35.1	55.6	25.2	1.16	4.40	12.9	5.87	0.36	1.38	5.57	2.53
12XE-1040-FR	129	97.0	44.0	71.3	32.3	1.66	6.29	18.5	8.39	0.52	1.97	7.96	3.61
12XE1010F-FR	158	107	48.7	68.5	31.1	2.14	8.08	23.8	10.8	0.67	2.53	10.2	4.64
12XE1110F-FR	167	114	51.7	75.2	34.1	2.08	7.87	23.2	10.5	0.65	2.46	10.0	4.52
12XE1150F-FR	181	129	58.6	88.6	40.2	2.37	8.96	26.3	11.9	0.74	2.80	11.3	5.14

Notes:

1. The nominal AH capacity is based on the 8 hour rate to 1.75Vpc final voltage at 77°F (25°C).
2. All values for lead, acid & electrolyte are per battery. All 12XE batteries contain 6 cells.
3. All values represent typical product characteristics and are subject to change without notice.

Applications Engineering

EnerSys
http://www.EnerSys.com
2366 Bernville Road - Reading, PA 19605
1-800-538-3627

Heat Generation Calculator for Lead-Acid Battery Products

Conditions:

Product Range	DataSafe XE		
Cell Model	12XE1040		
Disch Current/String	I_{dch}		Amps
AVG volts per cell	Vpc_{avg}		Volts
OR			
Power (Out)	P_{out}	1.040000	KW/C
Number of Strings	N_{str}	6	String(s)
Number Cells/String	N	240	Cell(s)
Discharge Time	T_{dch}	0.083	Hours
Charge Time	T_{chg}	12.00	Hours
Float Voltage (Nom.)	Vpc	2.27	Volts
Float Current (Nom.)	FC	28.3	mA/100Ah
Cell Nom Ah Rate	Ah	129	AH

Enter the type of cell being analyzed

Enter either discharge amps and average Vpc

OR power per cell to calculate power out of the cell.

Calculations:

Energy Out	E_{out}	124.30	kWhr
Energy In	E_{in}	155.38	kWhr
Energy Loss	E_{loss}	31.08	kWhr
Power on Float	P_{float}	113.3	Watts

Calculation Results for 6 Strings of 240 Cells of 12XE1040

Heat Generated per 12.1 Hour Cycle:	106048	BTU	or	31.1	kWhr
Heat Generated on 5 Min Discharge:	31814	BTU	or	9.3	kWhr
Heat Generated on 12 Hour Charge*:	74234	BTU	or	21.7	kWhr
Heat Generated on Float Charge:	386.6	BTU/hr	or	113.3	Watts

* NOTE: Assume evenly distributed during charge

Formulas:

$E_{out\ (kWhr)} = I_{dch} \times Vpc_{avg} \times N \times T_{dch}$ or $P_{out} \times N \times T_{dch}$	$Heat_{cyc\ (BTU)} = E_{loss} \times 3412.1$
$E_{in\ (kWhr)} = E_{out} \times 1.25$ - Avg Pb-acid is 80% Whr Efficient	$Heat_{dch\ (BTU)} = 30\% \ E_{loss} \times 3412.1$
$E_{loss\ (kWhr)} = E_{in} - E_{out}$	$Heat_{chg\ (BTU)} = 70\% \ E_{loss} \times 3412.1$
$P_{float\ (kW)} = [(FC/1000) \times (Ah/100) \times N \times Vpc \times 95\%] / 1000$	$Heat_{float\ (BTU/hr)} = P_{float} \times 3412.1$

Heat Generation Calculator for Lead-Acid Battery Products

Conditions:

Product Range	DataSafe XE		
Cell Model	12XE1040		
Disch Current/String	I_{dch}		Amps
AVG volts per cell	Vpc_{avg}		Volts
OR			
Power (Out)	P_{out}	1.040000	KW/C
Number of Strings	N_{str}	5	String(s)
Number Cells/String	N	240	Cell(s)
Discharge Time	T_{dch}	0.083	Hours
Charge Time	T_{chg}	12.00	Hours
Float Voltage (Nom.)	Vpc	2.27	Volts
Float Current (Nom.)	FC	28.3	mA/100Ah
Cell Nom Ah Rate	Ah	129	AH

Enter the type of cell being analyzed

Enter either discharge amps and average Vpc

OR power per cell to calculate power out of the cell.

Calculations:

Energy Out	E_{out}	103.58	kWhr
Energy In	E_{in}	129.48	kWhr
Energy Loss	E_{loss}	25.90	kWhr
Power on Float	P_{float}	94.4	Watts

Calculation Results for 5 Strings of 240 Cells of 12XE1040

Heat Generated per 12.1 Hour Cycle:	88373	BTU	or	25.9	kWhr
Heat Generated on 5 Min Discharge:	26512	BTU	or	7.8	kWhr
Heat Generated on 12 Hour Charge*:	61861	BTU	or	18.1	kWhr
Heat Generated on Float Charge:	322.1	BTU/hr	or	94.4	Watts

* NOTE: Assume evenly distributed during charge

Formulas:

$E_{out\ (kWhr)} = I_{dch} \times Vpc_{avg} \times N \times T_{dch}$ or $P_{out} \times N \times T_{dch}$	$Heat_{cyc\ (BTU)} = E_{loss} \times 3412.1$
$E_{in\ (kWhr)} = E_{out} \times 1.25$ - Avg Pb-acid is 80% Whr Efficient	$Heat_{dch\ (BTU)} = 30\% \ E_{loss} \times 3412.1$
$E_{loss\ (kWhr)} = E_{in} - E_{out}$	$Heat_{chg\ (BTU)} = 70\% \ E_{loss} \times 3412.1$
$P_{float\ (kW)} = [(FC/1000) \times (Ah/100) \times N \times Vpc \times 95\%] / 1000$	$Heat_{float\ (BTU/hr)} = P_{float} \times 3412.1$

Product data sheet

Specifications

Circuit breaker, PowerPacT L, unit mount, adjustable magnetic trip, 600A, 3 pole, 50kA, 500VDC

LLL37060D33

Main

Range	PowerPact
Product name	PowerPact L
Device short name	L-Frame
Product or Component Type	Circuit breaker
Device Application	Distribution

Complementary

Number of Poles	3P
Control Type	Toggle
Breaking capacity code	L
Breaking capacity	125 kA 240 V AC 50/60 Hz UL 489 100 kA 480 V AC 50/60 Hz UL 489 50 kA 600 V AC 50/60 Hz UL 489 20 kA 250 V DC UL 489 50 kA 500 V DC UL 489
[Ue] rated operational voltage	500 V DC
[Ics] rated service breaking capacity	125 kA 220/240 V AC 50/60 Hz IEC 60947-2 100 kA 380/440/415 V AC 50/60 Hz IEC 60947-2 50 kA 500/525 V AC 50/60 Hz IEC 60947-2 20 kA 250 V DC IEC 60947-2 20 kA 500 V DC IEC 60947-2
[Uimp] rated impulse withstand voltage	8 kV IEC 60947-2
Trip unit technology	Thermal-magnetic
Magnetic tripping current	1500…3000 A
[Ui] rated insulation voltage	750 V IEC 60947-2
Suitability for isolation	Yes IEC 60947-2
Utilisation category	Category A
AWG gauge	2 x AWG 2/0...500 kcmil aluminium/copper
Local signalling	Switched off (OFF) 1 trip indicator green)
Mounting mode	Unit mount lug)
Mounting Support	Lug
Electrical connection	Lugs line

* Price is “List Price” and may be subject to a trade discount – check with your local distributor or retailer for actual price.

	Lugs load
Terminal identifier	AL600LS52K3
Tightening torque	442.54 lbf.in (50 N.m) 0.11…0.37 in² (70…240 mm²) (2 x AWG 2/0...500 kcmil) 442.54 lbf.in (50 N.m) 0.05…0.47 in² (35…300 mm²) (AWG 2...600 kcmil)
Power wire stripping length	1.22 in (31 mm) 2.40 in (61 mm)
Color	Black
Height	13.39 in (340 mm)
Width	5.51 in (140 mm)
Depth	4.33 in (110 mm)
Net Weight	13.67 lb(US) (6.2 kg)
Communication interface	Modbus Ethernet

Environment

Standards	UL CSA NEMA NOM-003-SCFI-2000 IEC 60947-2
Product certifications	UL CSA NOM
IP degree of protection	Front cover IP40
Pollution degree	3 IEC 60947-1
Ambient air temperature for operation	28…158 °F (-2…70 °C)
Ambient Air Temperature for Storage	-58…185 °F (-50…85 °C)
Operating altitude	< 6561.68 ft (2000 m) without derating 5000 m with derating

Ordering and shipping details

Category	01116 - L ELEC TRIP UNIT MOUNT BREAKER/SW
Discount Schedule	DE2
Nbr. of units in pkg.	1
Package weight(Lbs)	15.00 lb(US) (6.804 kg)
Returnability	Yes
Country of origin	US

Packing Units

Unit Type of Package 1	PCE
Package 1 Height	13.44 in (34.131 cm)
Package 1 width	7.38 in (18.733 cm)
Package 1 Length	31.44 in (79.851 cm)

Offer Sustainability

Sustainable offer status	Green Premium product
California proposition 65	WARNING: This product can expose you to chemicals including: DINP, which is known to the State of California to cause cancer, and DIDP, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov
REACh Regulation	REACh Declaration

EU RoHS Directive	Compliant EU RoHS Declaration
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration Product out of China RoHS scope. Substance declaration for your information.
Environmental Disclosure	Product Environmental Profile
Circularity Profile	End of Life Information
PVC free	Yes

Contractual warranty

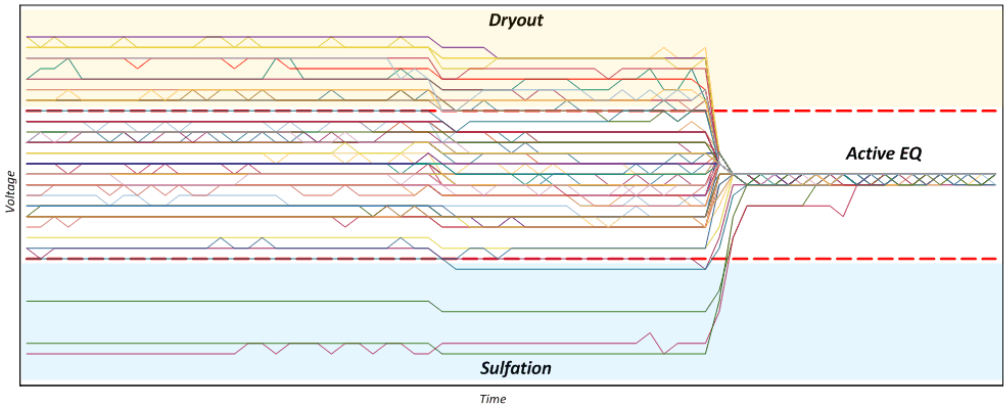
Warranty	18 months

BACS®

Battery Analysis and Care System
3rd Generation Battery Management System

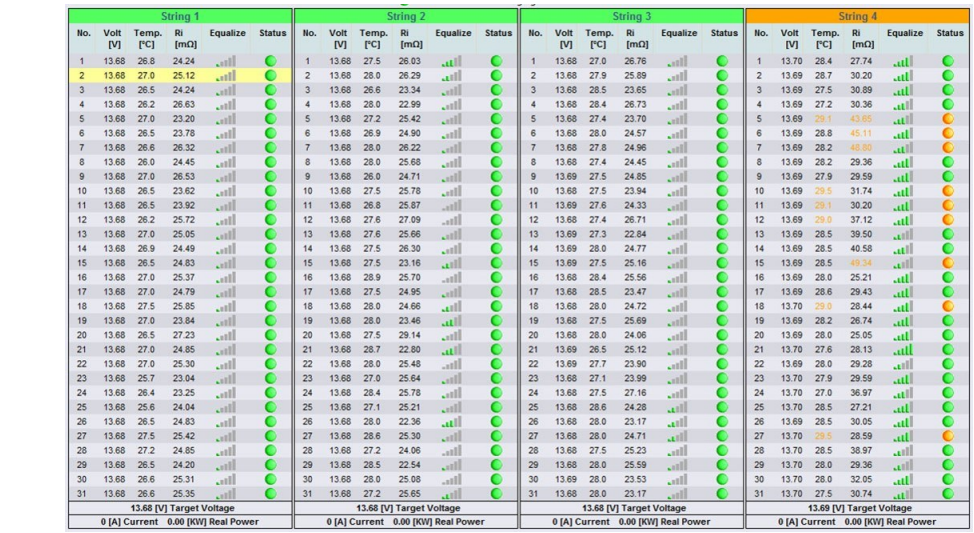
FEATURES

- Patented Active EQ
- Increased Battery Capacity
- Extends Battery life
- Fully Web-Based
- Downloadable battery history
- SNMP and Modbus communication
- Prevents unexpected battery failure
- Battery voltages 2-16 VDC
- Listed to UL 60950 standards
- IFC 608.3 Compliance



SPECIFICATIONS

Power Consumption (Normal):	**20mA**
Power Consumption (Sleep):	**<1mA**
Operating Temperature Range:	**0 to 60°C**
Internal Resistance Precision:	**<5%**
Voltage Precision:	**<0.5%**
Temperature Precision:	**<15%**
MTBF (Calculated):	**87,600 hours**



String 1

No.	Volt [V]	Temp. [°C]	Ri [mΩ]	Equalize	Status
1	13.68	26.8	24.24		
2	13.68	27.0	25.12		
3	13.68	26.5	24.24		
4	13.68	26.2	26.63		
5	13.68	27.0	23.20		
6	13.68	26.5	23.78		
7	13.68	26.6	26.32		
8	13.68	26.0	24.45		
9	13.68	27.0	26.53		
10	13.68	26.5	23.62		
11	13.68	26.5	23.92		
12	13.68	26.2	25.72		
13	13.68	27.0	25.05		
14	13.68	26.9	24.49		
15	13.68	26.5	24.83		
16	13.68	27.0	25.37		
17	13.68	27.0	24.79		
18	13.68	27.5	25.85		
19	13.68	27.0	23.84		
20	13.68	26.5	27.23		
21	13.68	27.0	24.85		
22	13.68	27.0	25.30		
23	13.68	25.7	23.04		
24	13.68	26.4	23.25		
25	13.68	25.6	24.04		
26	13.68	26.5	24.83		
27	13.68	27.5	25.42		
28	13.68	27.2	24.85		
29	13.68	26.5	24.20		
30	13.68	26.6	25.31		
31	13.68	26.6	25.35		

13.68 [V] Target Voltage
0 [A] Current 0.00 [KW] Real Power

String 2

No.	Volt [V]	Temp. [°C]	Ri [mΩ]	Equalize	Status
1	13.68	27.5	26.03		
2	13.68	28.0	26.29		
3	13.68	26.6	23.34		
4	13.68	28.0	22.99		
5	13.68	27.2	25.42		
6	13.68	26.9	24.90		
7	13.68	28.0	26.22		
8	13.68	28.0	25.68		
9	13.68	26.0	24.71		
10	13.68	27.5	25.78		
11	13.68	26.8	25.87		
12	13.68	27.6	27.09		
13	13.68	27.6	25.66		
14	13.68	27.5	26.30		
15	13.68	27.5	23.16		
16	13.68	28.9	25.70		
17	13.68	27.5	24.95		
18	13.68	28.0	24.66		
19	13.68	28.0	23.46		
20	13.68	27.5	29.14		
21	13.68	28.7	22.80		
22	13.68	28.0	25.48		
23	13.68	27.0	25.64		
24	13.68	28.4	25.78		
25	13.68	27.1	25.21		
26	13.68	28.0	22.36		
27	13.68	28.6	25.30		
28	13.68	27.2	24.06		
29	13.68	28.5	22.54		
30	13.68	28.0	25.08		
31	13.68	27.2	25.65		

13.68 [V] Target Voltage
0 [A] Current 0.00 [KW] Real Power

String 3

No.	Volt [V]	Temp. [°C]	Ri [mΩ]	Equalize	Status
1	13.68	27.0	26.76		
2	13.68	27.9	25.89		
3	13.68	28.5	23.65		
4	13.68	28.4	26.73		
5	13.68	27.4	23.70		
6	13.68	28.0	24.57		
7	13.68	27.8	24.96		
8	13.68	27.4	24.45		
9	13.69	27.5	24.85		
10	13.68	27.5	23.94		
11	13.69	27.6	24.33		
12	13.68	27.4	26.71		
13	13.69	27.3	22.84		
14	13.69	28.0	24.77		
15	13.69	27.5	25.16		
16	13.68	28.4	25.56		
17	13.68	28.5	23.47		
18	13.68	28.0	24.72		
19	13.68	27.5	25.69		
20	13.68	28.0	24.06		
21	13.69	26.5	25.12		
22	13.69	27.7	23.90		
23	13.68	27.1	23.99		
24	13.68	27.5	27.16		
25	13.68	28.6	24.28		
26	13.68	28.0	23.17		
27	13.68	28.0	24.71		
28	13.68	27.5	25.23		
29	13.68	28.0	25.59		
30	13.69	28.0	23.53		
31	13.68	28.0	23.17		

13.68 [V] Target Voltage
0 [A] Current 0.00 [KW] Real Power

String 4

No.	Volt [V]	Temp. [°C]	Ri [mΩ]	Equalize	Status
1	13.70	28.4	27.74		
2	13.69	28.7	30.20		
3	13.69	27.5	30.89		
4	13.69	27.2	30.36		
5	13.69	29.1	43.65		
6	13.69	28.8	45.11		
7	13.69	28.2	48.80		
8	13.69	28.2	29.36		
9	13.69	27.9	29.59		
10	13.69	29.5	31.74		
11	13.69	29.1	30.20		
12	13.69	29.0	37.12		
13	13.69	28.5	39.50		
14	13.69	28.5	40.58		
15	13.69	28.5	49.34		
16	13.69	28.0	25.21		
17	13.69	28.6	29.43		
18	13.70	29.0	28.44		
19	13.69	28.2	26.74		
20	13.69	28.0	25.05		
21	13.70	27.6	28.13		
22	13.69	28.0	29.28		
23	13.70	27.9	29.59		
24	13.70	27.0	36.97		
25	13.70	28.5	27.21		
26	13.69	28.5	30.05		
27	13.70	29.5	28.59		
28	13.70	28.5	38.97		
29	13.70	28.0	29.36		
30	13.70	28.0	32.05		
31	13.70	27.5	30.74		

13.69 [V] Target Voltage
0 [A] Current 0.00 [KW] Real Power

The Generex BACS® is the most advanced product of its kind on the market today. A web-based integrated battery monitoring and management system, BACS® uses web management technology to monitor the temperature, internal resistance, and voltage of every single battery in a given system.

Through our patented voltage balancing process—called **Active EQ,** BACS® balances the charging voltage of all batteries with the charger's target value, keeping all batteries within optimal voltage operating range.

The constant monitoring and harmonization of the individual charging voltages helps to guarantee the availability of the battery at all times, making the Achilles' heel of any Battery system a thing of the past!

What's more, BACS® has the capacity to manage environmental measurements (temperature, humidity, electrolyte level, hydrogen gas concentration, etc.) and equipment (UPS, inverters, transfer switches, generators, dry contacts, air conditioning systems, etc.).

BACS® is the ideal system for lead-acid batteries (open/wet cell, maintenance free, gel, AGM, etc.), as well as NiCad, NIMH and most types of Li-Ion batteries.

GENEREX

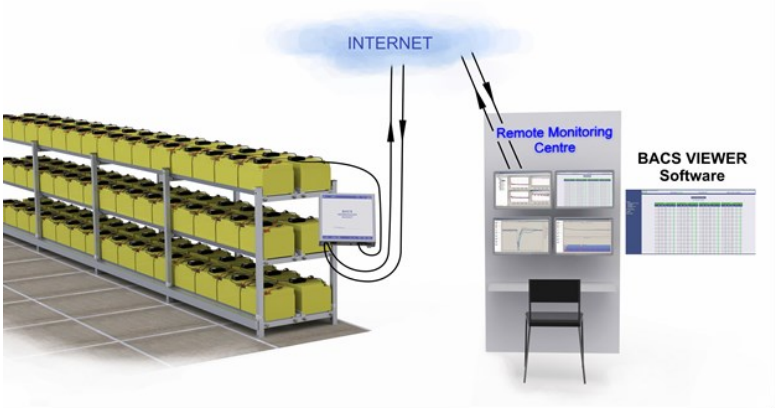
18610 Starcreek Dr, Suite D Cornelius, NC 28031
(704) 966-1447 www.generex.us
sales@generex.us

BACS® modules - Technical data

Construction	Measuring modules with Active EQ BACS patent no.: DE 102004013351.4
Current Consumption	Normal operation: 15 - 20mA (C20, C23, C30) 35 - 40mA (C40, C41) Sleep Mode: < 1mA
Measuring Precision	Internal resistance : < 10 % C40/41, < 5% at C20/23/30 Voltage : < 0.5 % Temperature: < 15 %
Interface	2x RJ10 for BACS battery bus Internal RS232 bus interface 1x button for the addressing Temperature sensor -35 bis + 85 °C Optical display LED (alarms red/green, mode red/green)
Housing Dimensions and weight	ABS housing (UL certified, flame retardant)55 x 80 x 24 mm = 2,17 x 3,15 x 0,94 in. (B x H x T), 45g
Operating Condition	Temperature 0 - 60°C, max. humidity 90%, not condensing IP 42 coated against dust and condensate)
MTBF	87,600 hours (10 years)

Module Type	BACS C20	BACS C23	BACS C30	BACS C40	BACS C41
Voltage Range	*9.7-17V*	*9.7-21V*	*4.8-8.0V*	*1.25-3.2V*	*2.4-5.0V*
RI Range	*0.5-60mOhms*	*0.5-60mOhms*	*0.5-60mOhms*	*0.02-6mOhms*	*0.5-30mOhms*
Bypass Current	*150mA*	*120mA*	*300mA*	*900mA*	*300mA*

BACS® Webmanager IV - Technical data



Processor and memory	ARM Cortex A8 800MHz processor, 512MB RAM
Sensors & Power consumption	Stabilized external power supply 12V 2000mA supplies 1830mA for up to 330 BACS C modules and BACS bus sensors
Interfaces	3x RS-232 interfaces, 2x battery bus converter outputs internal 1x RJ45, 10/100Mbit Ethernet 1x potential-free contact
Display/Signal	3x LED (Manager status, UPS/device alarm, BACS alarm) 1x Buzzer with mute button
Dimensions and Weight	Aluminum, RAL 7035 130 x125 x 30mm = 5,12 x 4,92 x 1,18 in. (W x L x H) 180g
Operating condition	Temperature 0 - 60°C, max. humidity 20 - 95%, not condensing
MTBF	849,192 (96 years)

GENEREX

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GENEREX

Application Note #015.1
IFC2018 Chapter 12 Section 1206.2.10.7
(formerly IFC 608.3)

January 31, 2018

Summary

The International Fire Code (IFC) Chapter 12 sets requirements for Stationary Storage Battery Systems. Section 1026.2.10.7 indicates 'VRLA and NiCad battery systems shall be provided with a listed device or other approved method to preclude, detect and control thermal runaway.' This application note will provide guidance on how the Generex system complies with IFC 1206.2.10.7.

Thermal Runaway

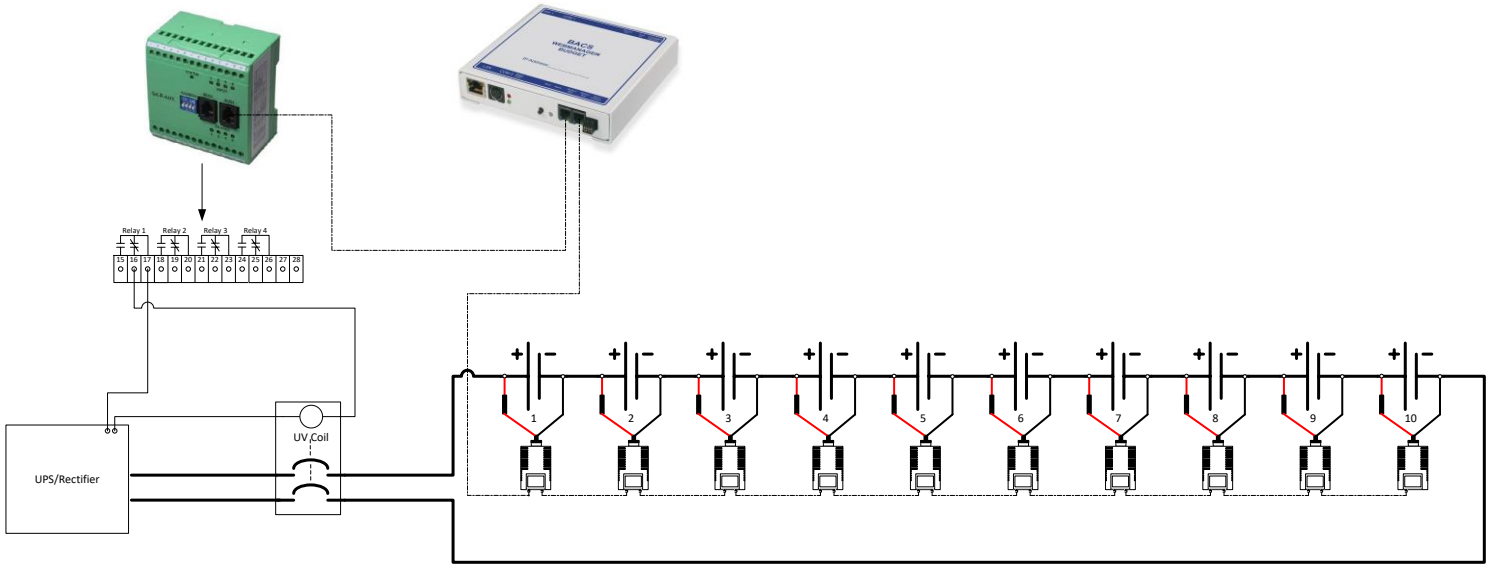
Thermal runaway occurs when heat is generated faster than the heat can be dissipated through the case. The VRLA battery is designed to dissapate the heat through the case into the ambient area. The internal heat produced (at the negative post) is due to the electrochemical reactions due to the discharging and recharging. Thermal runaway is more likely to occur on the recharge event versus during a discharge. The internal heat is proportional to the amount of current going into the battery when it is on a float charge. Due to there being no load on the battery while on float the power required to charge the battery is converted into heat. The tendency of thermal runaway depends on factors such as battery state of health, battery age, high ambeint temperatures and high charging currents.

IFC 1206.2.10.7

Building and fire codes vary by city, IFC 608.3 may or may not be applicable in certain regions of the United States. Check with local jurisdiction on code requirements. This section of the IFC indicates that a VRLA or Lithium metal battery system need to have a device that is listed to UL standards to detect and to stop a thermal runaway.

BACS IFC 1206.2.10.7 Solution

Each BACS 'C' module is equipped with an on board temperature sensor to provide a temperature reading for each battery. The BACS Webmanager has a thermal runaway detection algorithm to identify those batteries displaying thermal runway conditions. The BACS Webmanager in conjunction with the GX-R-AUX device can disconnect the battery breaker or charging circuit to the battery string, therefore isolating and preventing a thermal runaway. One GX-R-AUX can control up to four different battery strings and if necessary multiple GX-R-AUX devices may be added to the BACS System. The BACS system is UL listed to UL 60950-1 by Nemko which is a nationally recognized testing laboratory (NRTL).



GENEREX

BACS with GX-R-AUX (IFC 608.3)

SIZE	FSCM NO	DWG NO	REV
			1
SCALE	NA		SHEET 1 OF 1

GENEREX

Application Note #015.1
IFC2018 Chapter 12 Section 1206.2.10.7
(Formerly IFC 608.3)

January 31, 2018

References

2018 International Fire Code . Retrieved January 31, 2018 from

https://codes.iccsafe.org/public/document/IFC2018/CHAPTER-12-ENERGY-SYSTEM

Hoff, M., & Steeves, K. (2005). New Insights into Thermal Runaway of Valve Regulated Lead-Acid Batteries. Battcon 2005 Conference, Miami Beach, FL, Retrieved February 15, 2008 from http://www.battcon.com.

Baileys, D. (2009). Minimizing Unplanned Outages Due to VRLA Battery Systems Failures.

Nemko Certificate NA201410352 Issued to Generex Systems June 24, 2014: GX-R-AUX

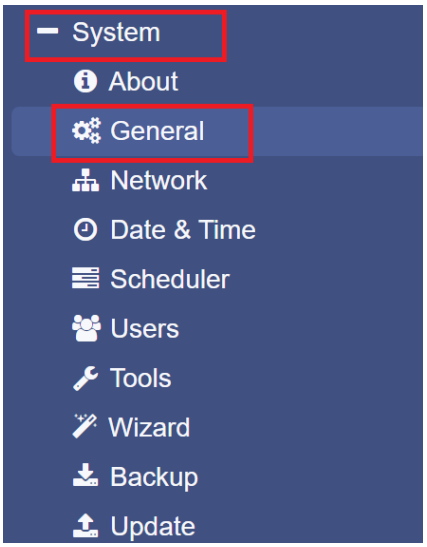
Nemko Certificate NA201210162 Issued to Generex Systems December 12, 2016: BACS System

Application Note #010

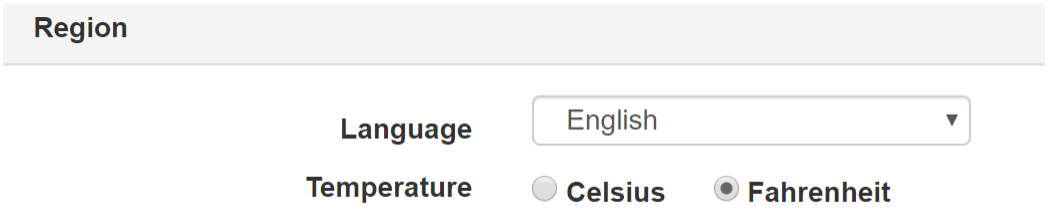
Thermal Runaway Configuration

August 29th 2016

1. Select **System-General**

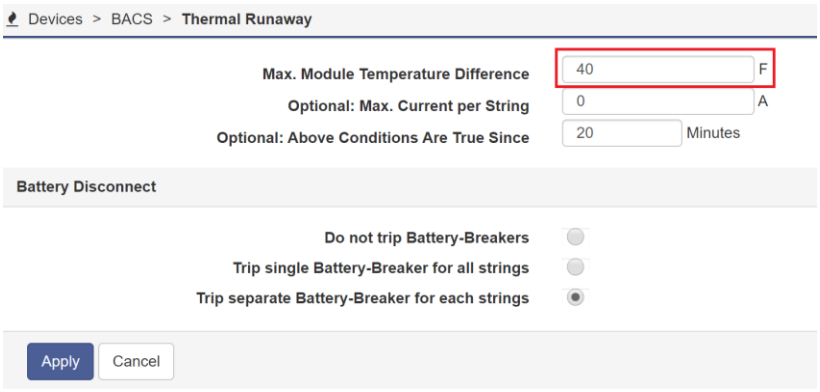


2. Select Celsius or Fahrenheit

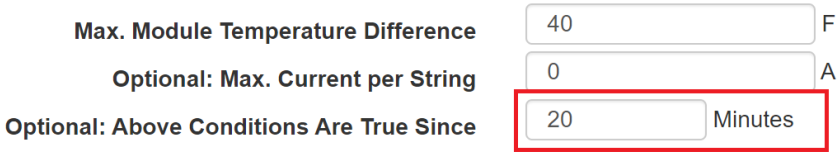


3. Click **Apply**

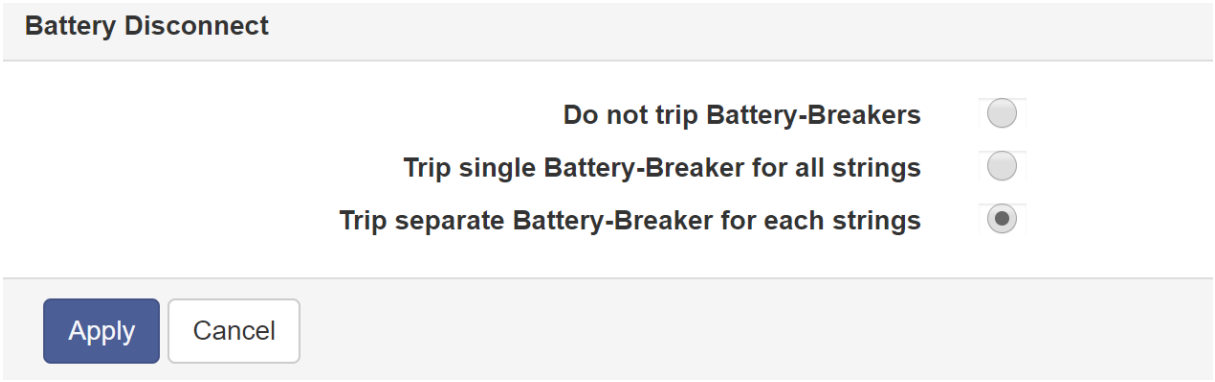
4. Under **Devices>BACS>Thermal Runaway** Settings Enter the **Max. Module Temperature Difference** that you want to set to trigger the alarm.



5. Under **Optional: Above Conditions Are True Since,** Enter the number minutes you want the above conditions to be true before alarm triggers.

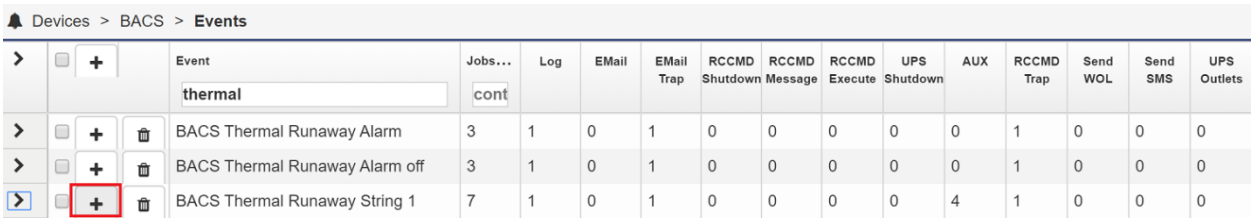


6. **Under Battery Disconnect** Select the number of connected GX_R_AUX devices in your BACS bus then select **Trip separate Battery-Breakers for each string**.



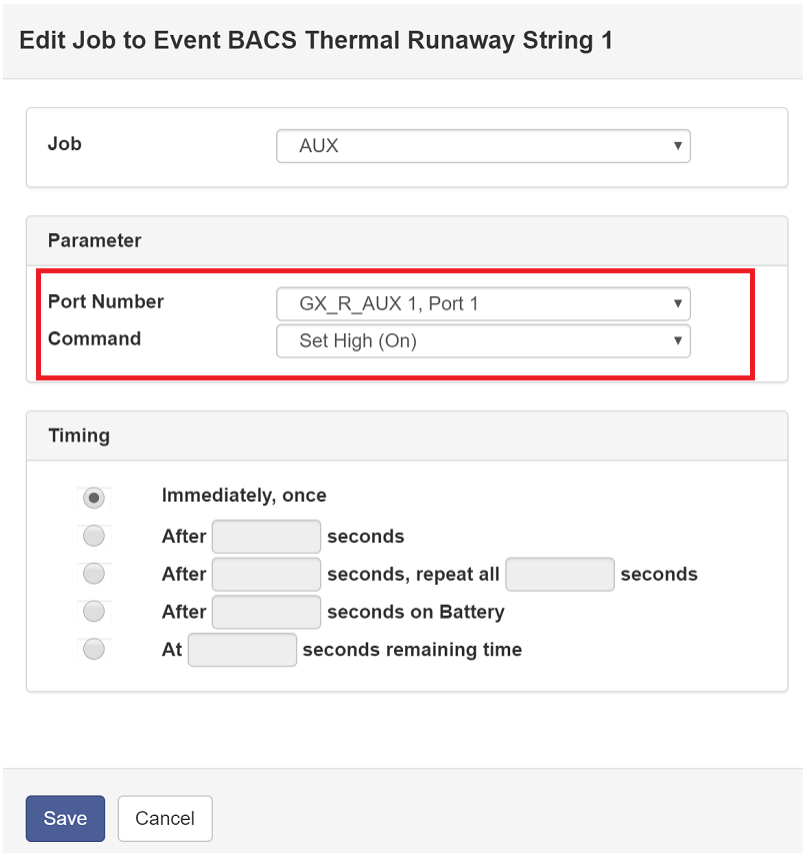
7. Click **Apply**

8. Select **Devices-BACS-Events** and search for Thermal Runaway string 1



9. Click **Add New Job (+)**

10. On Function use the drop down-menu and select **Switch Outlet**; For Port number select **GX_R_AUX Outlet1**; For Command select **Set High**



11. Click **Apply**

TBC48 Battery Cabinet

With Draw Out Trays

Installation, Operation, & Maintenance Manual

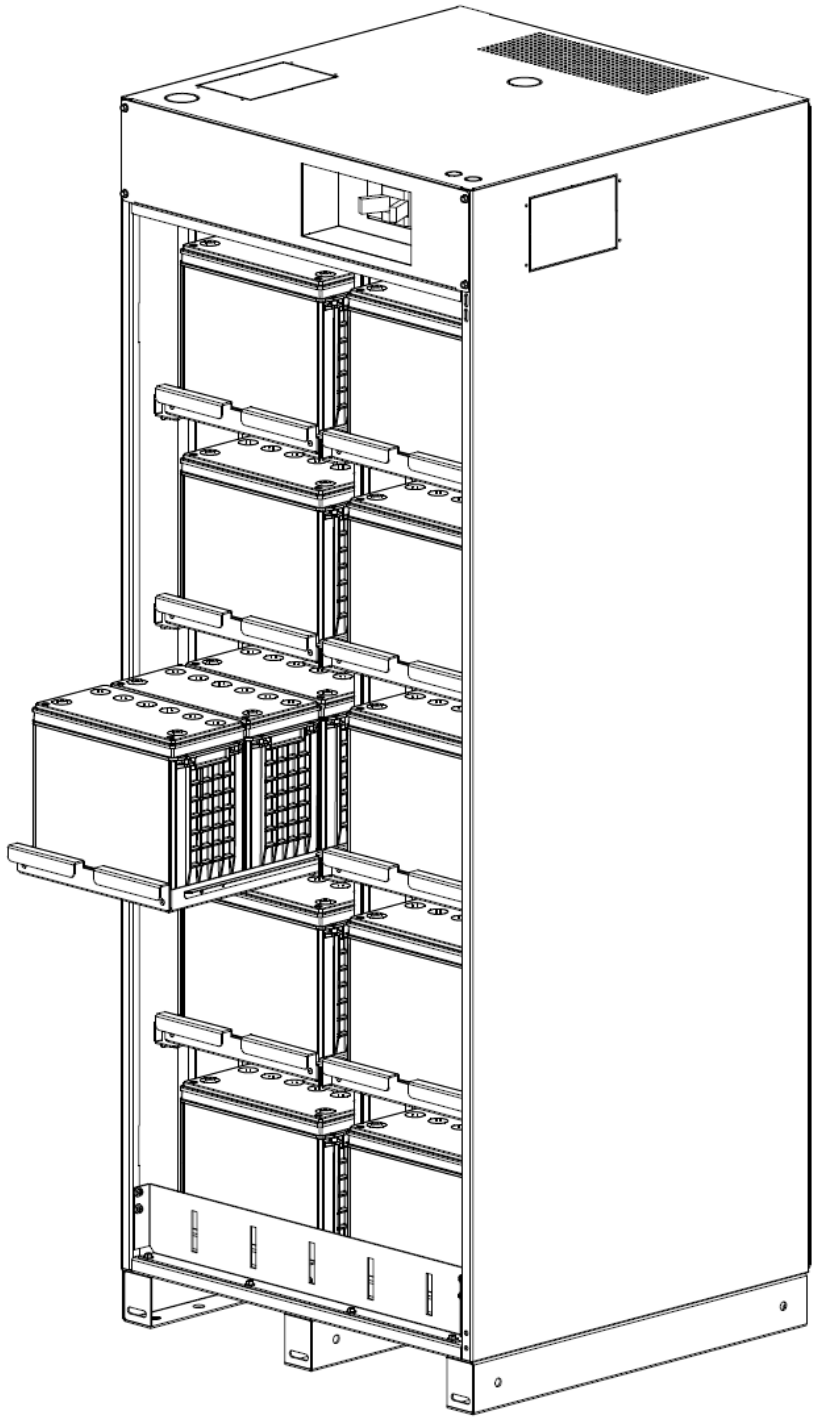


TABLE OF CONTENTS

1. IMPORTANT INFORMATION ABOUT THIS MANUAL

SAVE THESE INSTRUCTIONS! This manual contains important information that is needed during the installation and maintenance of the system.

1.1 MANUAL SYMBOLS

Warning / Caution:
Indicates information provided to protect the user against personal injury, safety hazards, and/or possible equipment damage.

Important:
Indicates information provided as an installation or operating instruction or tip as well as general important installation and system information.

2. SAFETY PRECAUTIONS

Before installing or maintaining this system, it is extremely important to read this manual and be sure that all system drawings and schematics are reviewed and clearly understood. If there are any questions concerning this manual or any of the installation or maintenance procedures and/or requirements please contact a C&C Power representative before proceeding.

When installing this power system, follow all applicable federal, state and local regulations as well as industry guidelines to insure proper system installation.

Only qualified electricians or DC power technicians should attempt to install or service this equipment.

System installation and maintenance should always be performed with heavily insulated tools. It is also recommended to wear rubber gloves, boots, and use insulating mats to stand on when working on this equipment.

Always wear eye protection when installing or maintaining batteries and/or power equipment.

Do not attempt to unpack or move the battery cabinet without assistance. Use appropriate handling equipment rated to bear the weight and bulk of the battery cabinet, such as freight elevators, pallet jacks and forklifts. (Fully extend forks under load. Spread forks to maximum possible width under load. Lift cabinet from bottom only. Wear safety shoes.)

Do not smoke or present open flames near any battery system.

For the safety of others, never leave an open cabinet or panel unattended.

To reduce the risk of fire, replace fuses with the same type and rating of fuses supplied with the system.

DC Power and Batteries can be very dangerous and have extremely high short circuit current. Electrical shock, severe burns, fire or death can result from a system short.

To avoid personal injury including electrical shock, severe burns and possible death, all jewelry including bracelets, rings and watches must be removed prior to installing or servicing this system.

Do not open or mutilate batteries. Opened or severely damaged batteries can release toxic electrolyte which is harmful to the skin and eyes.

Never lay loose cables, metal parts or tools on top of batteries.

Under certain conditions, batteries can vent potentially explosive gas (hydrogen). Never enclose batteries or battery cabinets in a sealed room.

Do not draw out multiple fully loaded battery trays at any time.

Do not modify or over extend any draw out tray shelf past the integrated safety stops. Crushing forces, risk of electrical shock, severe burns, fire or death may result from a dropped battery tray.

3. INSPECTION UPON RECEIPT OF GOODS

3.1 GENERAL

Special precautions and care have been taken to ensure the system arrives safe and undamaged. However, upon receipt, you should inspect the entire shipment, including the crate and any boxes for evidence of damage that may have occurred during transit.

3.2 VISIBLE DAMAGE

It is the responsibility of the person receiving the shipment to inventory and fully inspect all materials against the bill of lading or weigh bill IMMEDIATELY while the carrier representative is still present. Insure that all items are accounted for, including number of skids and quantity of boxes. Also note any visible external damage that may have occurred during transit. Make all applicable notations on the delivery receipt before signing and file a damage report with the carrier.

3.3 CONCEALED DAMAGE

Within 3 to 30 days of receipt (depending on courier), unpack the system and check for any concealed damage. Check the materials received against the detailed packing list to verify the quantity and the condition as complete and satisfactory.

Note any damage to the internal packaging, then request an inspection by the carrier and file a concealed damage claim. If there is a material shortage, contact your system supplier to file a claim.

Please contact your shipping company for all shipping damage.

3.4 RETURN OF DAMAGED GOODS

Should equipment be damaged and require return for repair, a representative will provide instructions along with an RMA number to expedite the return.

A RMA number must be obtained before returning equipment.

4. SYSTEM OVERVIEW

During normal operating conditions the UPS supplies power to the load as well as the necessary power required to keep the batteries at the proper float voltage. When AC power fails, the batteries will discharge in order to provide the necessary backup power to the load. It is the responsibility of the customer to make sure the batteries are not discharged below manufactures recommendations. After any battery discharge has occurred, the batteries should be recharged as soon as possible. Batteries will be damaged if not properly recharged right away. See the UPS manual for more information on charging the batteries.

Battery Draw Out Tray Feature

The battery cabinet assembly is configured with draw out trays for ease of access to service batteries within the assembly.

5. SYSTEM SPECIFICATIONS

5.1 BATTERIES

Please refer to system drawings for model specific information.
Type: Valve Regulated Lead Acid (VRLA), sealed, non-spillable
Voltage: 12 VDC Nominal

> Only cabinets with **Flame Retardant Batteries** are suitable for computer room use.

5.2 SYSTEM GROUNDING

> All system ground wires should be derived from the main building ground source.

Cabinet Safety Ground: Each cabinet is supplied with a mechanical ground lug that accepts bare wire from #6 AWG to 300 MCM cable.
Torque: 325 lb-in
Wire Size and Type: Ground wire should be sized per NEC and/or all applicable national and local codes.

Minimum Size Conductor for Grounding the Battery Cabinet		
Battery Cabinet Breaker or Fuse Size	Copper Wire Size	Aluminum Wire Size
Up to 200 Amps	6 AWG	4 AWG
201-300 Amps	4 AWG	2 AWG
301-400 Amps	3 AWG	1 AWG
401-500 Amps	2 AWG	1/0 AWG
501-600 Amps	1 AWG	2/0 AWG

5.3 DC OUTPUT

Please refer to system drawings for model specific information.
Voltage: 12-480 VDC Nominal
Circuit Breaker: UL Listed 600 VDC rated. See system drawings for details.
Wire Size and Type: 75°C rating; size per NEC Table 310.16 and/or all applicable national and local codes.

> Wire should be sized for a maximum voltage drop of 0.5 volt.

5.4 GENERAL SPECIFICATIONS

Cabinet Size: 32”W x 32.0”D x 82.0”H
Empty Cabinet Weight (approximately): 488 lbs.
Operating Temperature: 20°C to 25°C (68°F to 77°F) recommended for optimum battery performance.
Ventilation: Ventilation holes are located in the front, rear, and top of the cabinet. Clearance around the equipment should be as suggested by NEC and/or all applicable national and local codes. A minimum rear clearance of 2 inches is recommended for optimal cooling of the equipment.

Under certain conditions, batteries can vent potentially explosive gas (hydrogen). Never enclose batteries or battery cabinets in a sealed room.

Batteries should be stored no longer than three months at 25°C (77°F) or lower before recharging. Exceeding the recommended ambient storage temperature may cause damage to the batteries.

6. INSTALLATION

6.1 PREPARATION

6.1.1 EQUIPMENT INSPECTION

Remove the equipment from the packaging material and inspect for any shipping damage that may have been overlooked upon receipt of goods. Verify that the system includes all necessary hardware for installation.

6.1.2 NECESSARY EQUIPMENT AND TOOLS

- Heavily insulated assortment of hand tools
- Digital voltmeter

6.1.3 INSTALLATION SAFETY PRECAUTIONS

Before proceeding with system installation, be sure to review and understand all of the SAFETY PRECAUTIONS in this manual!

DC VOLTAGE WARNING!

Hazardous DC voltages are present in the system. This hazard will always be present in a battery system including when it is offline. Accidental short circuit of the positive and negative terminal will cause tremendous currents to flow resulting in electrical shock, severe burns, fire and possible death! Use extreme caution when installing and maintaining the system!

6.2 INSTALLATION STEPS

Before installing or maintaining this system, it is extremely important to read this manual and be sure that all system drawings and schematics are reviewed and clearly understood. If there are any questions concerning this manual or any of the installation or maintenance procedures and/or requirements please contact a C&C Power representative before proceeding.

6.2.1 EQUIPMENT LOCATION

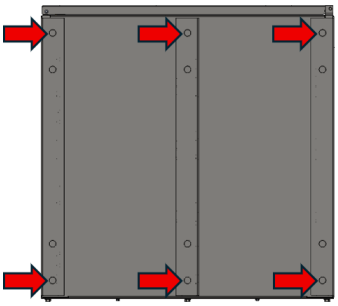
Prior to installation, verify floor loading requirements and all applicable codes pertaining to the related equipment. Environmental conditions should also be reviewed. Battery systems require an area with proper ventilation and cooling. An ambient temperature between 20°C to 25°C (68°F to 77°F) is recommended for optimum battery life and performance. The cabinet has vent holes located at the front, top, and rear of the system. Never install the cabinet into a sealed enclosure. Clearance around the equipment should be as suggested by NEC and/or all applicable national and local codes. A minimum rear clearance of 2 inches is recommended for optimal cooling of the equipment.

Under certain conditions, batteries can vent potentially explosive gas (hydrogen). Never enclose batteries or battery cabinets in a sealed room.

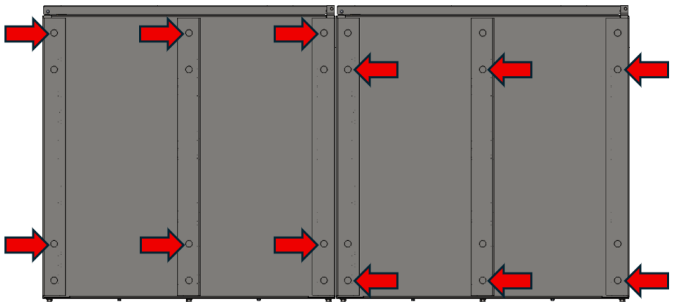
6.2.2 EQUIPMENT MOUNTING

Do not attempt to unpack or move the battery cabinet without assistance. Use appropriate handling equipment rated to bear the weight and bulk of the battery cabinet, such as freight elevators, pallet jacks and forklifts. (Fully extend forks under load. Spread forks to maximum possible width under load. Lift cabinet from bottom only. Wear safety shoes.)

1. The battery cabinet is equipped with pallet jack or forklift access openings in the front and rear of the cabinet. Move the equipment into the desired location and set in place.
2. On the floor in the desired location, mark the location of the 6 mounting holes found at the bottom of the 3 cabinet legs. Each leg has 4 mounting holes available in order to stagger the mounting hardware for cabinets mounted side by side. Only 2 of the 4 available holes per leg (1 front and 1 rear) should be used to mount the equipment.



RECOMMENDED MOUNTING HOLES FOR A SINGLE CABINET INSTALLATION



RECOMMENDED MOUNTING HOLES FOR A CABINET LINEUP INSTALLATION

6.2.3 EQUIPMENT GROUNDING

All system ground wires should be derived from the main building ground source.

For multi cabinet systems, each cabinet needs to have a designated cabinet ground wire derived from the main building ground source.

Terminate a cabinet ground wire from the main building ground source to the supplied #6-300MCM mechanical lug located on the breaker pan. See section 6.2 for sizing recommendations. Wire should be sized per NEC and/or all applicable national and local codes.

6.2.4 DC CONNECTIONS

Review the attached system drawings and schematics for model specific information on DC output connections.

Wire should be sized for a maximum voltage drop of 0.5 volt.

Battery cabinets that are not supplied with an incorporated DC output disconnect device must have an appropriate disconnect device provided external to the cabinet.

Verify that the output breaker is in the off/open position before making any DC connections to additional cabinets or to the UPS. Also verify that the UPS charger is not running.

1. Open the cabinet doors and check for any noticeable problems or damage that may have occurred during shipment.
2. Review the attached installation drawing and schematic.
3. Check and re-torque internal battery connections, as shipping may have caused these connections to come loose. Proper torque values are noted on the drawing and also on the battery case.
4. Connect main cables from the UPS or charger source to the battery cabinet output. The battery cabinet output connection point will vary depending on the cabinet configuration. The main output connection point may be directly to the circuit breaker, to the fuse block, or to a terminal block or bus bars. Review the supplied cabinet drawing for information on the battery cabinet output. All cables should be sized per NEC and any other local codes pertaining to this equipment. Refer to the UPS or charger manual for wiring external batteries. Note: Make sure charging source is disconnected before making these connections.
5. Connect the 2 pole disconnects that were disconnected for shipping and install as shown on the drawing. The connectors are labeled with letters “A” through “P” and are only to be

plugged into the corresponding lettered connector. IE cable connector “A” only plugs into fixed connector “A”.

6.2.5 SYSTEM OPERATION

Please refer to the UPS system manual for system start up and operation information.

7. SYSTEM MAINTENANCE

> ⚠ Before proceeding with system maintenance, be sure to review and understand all of the SAFETY PRECAUTIONS in this manual!

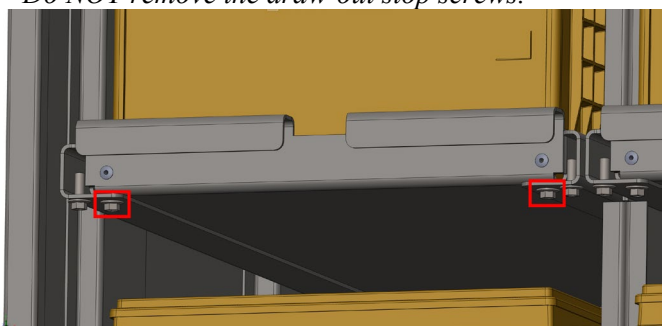
> ⚠ Verify that the output breaker is in the off/open position before servicing the system.

7.1 USING THE BATTERY DRAW OUT TRAYS

> ⚠ This cabinet is equipped with battery draw out trays. When batteries are serviced the trays must be pulled out and pushed back correctly and safely. The potential to injury and equipment damage may occur if instructions are not followed.

> ⚠ Caution: Risk of dropping heavy load of batteries by falling battery draw out tray shelves.

1. Pull out and service only one tray at a time. Do not leave pulled out trays unattended.
2. Prior to moving a tray, review the respective tray; safely disconnect two pole disconnects and monitoring cables that may route to adjacent tiers or neighboring trays as these may inhibit proper tray movement.
3. Disconnect the respective tray ground whip from the quick disconnect.
4. Remove the two screws securing the tray in place.
   Do NOT remove the draw-out stop screws.



5. Pull the battery tray out. *Please note that battery tray maximum travel distance is limited by design to prevent from falling out of the cabinet.*
6. When maintenance is complete, push the tray completely in.
7. Replace the two screws securing the tray in place.

7.2 BATTERY REPLACEMENT

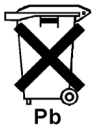
> ⚠ When batteries are replaced they must be properly installed paying special attention to terminal polarity orientation! If wired incorrectly it will cause a short in the system and can result in electrical shock, severe burns, fire and possible death! Be sure to review the system schematics before terminating any battery cables.

Caution: When completely removing batteries, the batteries must always be unloaded by working from top to bottom and loaded from the bottom towards the top to maintain a safe center of gravity while using the trays. This is to ensure a safe center of gravity when fully loaded trays are drawn out.

Caution: Risk of dropping heavy load of batteries by falling battery draw out tray shelves.

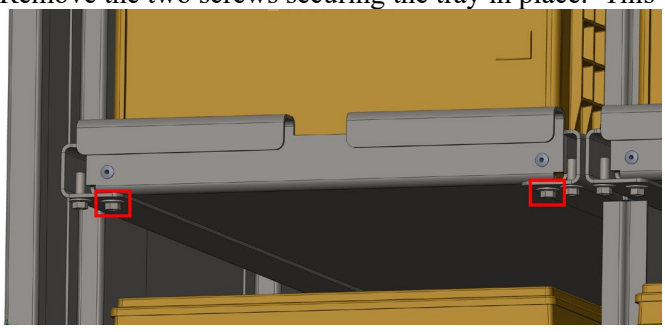
Caution: It is recommended that only one fully loaded shelf is to be pulled out at any one time.

Do not dispose of batteries in a fire. The batteries may explode. Contact your local hazardous waste or recycling center for battery disposal requirements.



Do not discard batteries in the trash. This product contains sealed lead acid batteries. Contact your local hazardous waste or recycling center for battery disposal requirements.

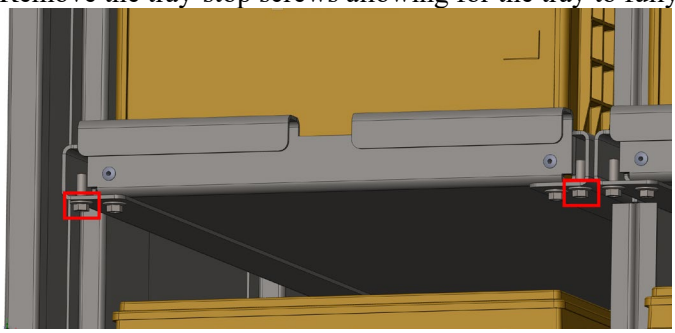
1. Prepare the new battery for installation. Verify that the battery is the same type and amp-hour rating as the batteries that are in the system.
2. Using a digital voltmeter, measure the battery voltage to verify that it is 12.6 VDC or above.
3. Use a brass wire brush or abrasive pad to polish the battery terminals.
4. If required by the battery manufacturer, apply no-ox type terminal grease to the battery terminals to avoid corrosion.
5. Disconnect the UPS from the battery string by turning off/opening the circuit breaker in the battery cabinet.
6. Disconnect the connectors on the battery tray or tier for the battery to being replaced.
7. Remove the two screws securing the tray in place. This will allow the tray to be drawn out.



8. The battery tray may also be fully removed if desired.

A battery lift MUST be used when removing an entire tray. Trays can weigh up to 500lbs

9. Remove the tray-stop screws allowing for the tray to fully removed



10. One tray at a time, pull out the tray that will be serviced.
11. Remove the cables from the battery or batteries being replaced.
12. Remove the battery or batteries being replaced. Depending on battery location, it may be necessary to remove additional batteries within the same tray to safely gain access to the bad battery.
13. Put the new battery or batteries into place. Make sure new battery is installed properly regarding polarity orientation.
14. Reconnect the battery cables ensuring to torque them to the specified torque on the battery label.
15. Push in the battery tray back in carefully.
16. Reinstall the tray-stop screws and the screws securing the battery tray.
17. Reconnect the cable connectors that were disconnected previously.
18. Check the battery string voltage at input side of the circuit breaker.
19. Reconnect the UPS to the battery string by turning on/closing the circuit breaker in the battery cabinet.