

PRCTI20240333, Rev.1

These calculations must be on site and made available by the Permittee for all inspections.



October 9, 2025

**City of Puyallup
Building
REVIEWED
FOR
COMPLIANCE**

BSnowden

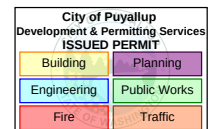
10/15/2025

1:32:35 PM



STRUCTURAL CALCULATIONS
(Permit Submittal)

**CENTERIS DATA CENTER
LEVEL 1 BATTERY CABINET ANCHORAGE**
1023 39th Avenue SE
Puyallup, WA 98374

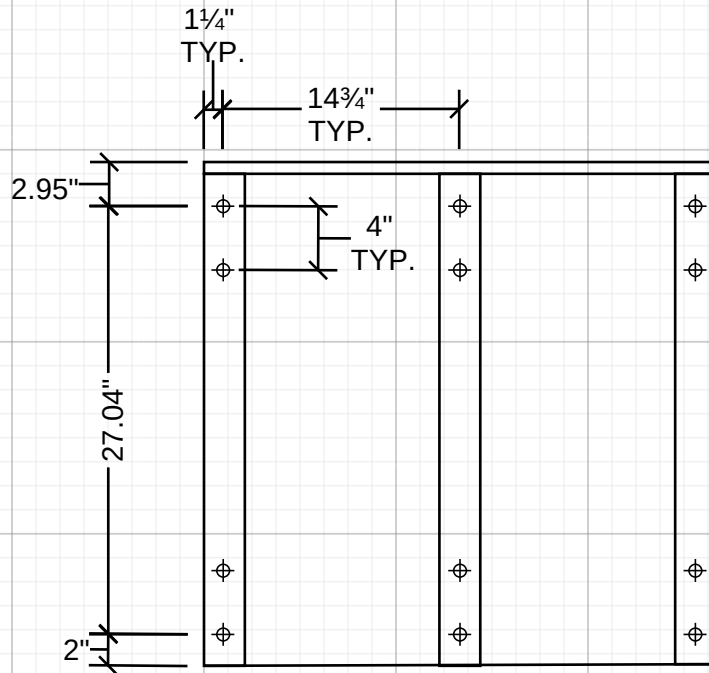


Quantum Job Number: 23444.01

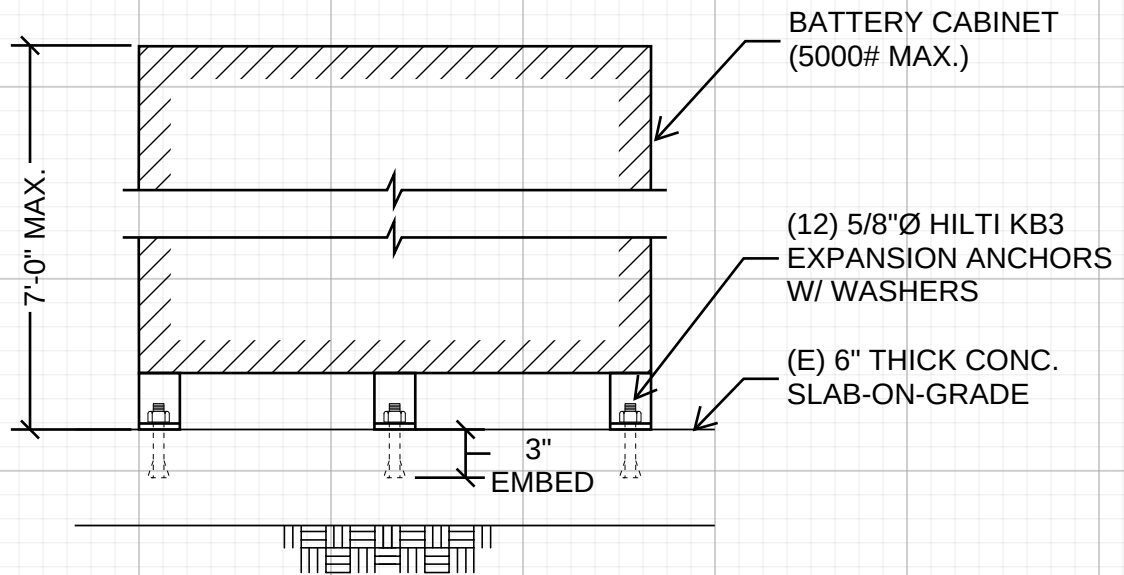


Prepared for:
CENTERIS DATA CENTERS
18300 Cascade Avenue S
Seattle, WA 981188

Prepared by:
QUANTUM CONSULTING ENGINEERS
1511 Third Avenue, Suite 323
Seattle, WA 98101
TEL 206.957.3900
FAX 206.957.3901



ANCHOR PLAN



SECTION VIEW

BATTERY CABINET ANCHORAGE

SCALE: N.T.S.



1511 THIRD AVENUE
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www.quantumce.com

CENTERIS DATA CENTER - SOUTH HILL
project

CENTERIS
client

10/09/2025
date

drawn by:
TVM
design by:

23444.01
job no.

SSK-46
sheet no.

Non-Structural Component Seismic Anchorage Design

IBC 2021, ASCE 7-16 Chapter 13

Seismic Criteria:

Site Class:	D	z:	0.0 ft	Table 13.5-1
S_{DS} :	1.01	h:	80.0 ft	
S_{D1} :	0.5	a_p :	1	
I_p :	1	R_p :	2.5	
		Ω :	2	

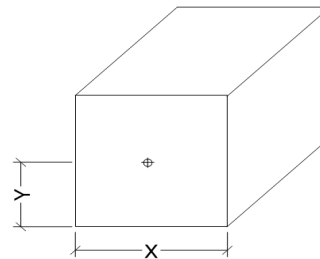
$$F_{p_{Max}} = 1.62 W_p \quad F_{p_{Max}} = 1.6 S_{DS} W_p I_p \quad \text{EQ 13.3-2}$$

$$F_p = 0.16 W_p \quad F_p = 0.4 a_p S_{DS} W_p \times (1 + 2z/h) / (R_p / I_p) \quad \text{EQ 13.3-1}$$

Controls $F_{p_{Min}} = 0.30 W_p \quad F_{p_{Min}} = 0.3 S_{DS} W_p I_p \quad \text{EQ 13.3-3}$

Mechanical Unit:

Ht to Center of Mass, Y:	41 in
Overturning Distance, X:	29 in
Weight, W_p :	5.00 k
Anchors/Side:	2



Shear and Overturning Loads:

Seismic Force, F_p :	1.52 k	
Shear/Anchor:	0.38 k	ULT
	0.27 k	ASD
OT Moment:	62.1 k-in	
Tension/Side:	-2.142 k	ULT
Net Uplift/Anchor:	-1.27 k	ULT (0.9-0.2 S_{Ds})DL + Ω EQ
	-0.93 k	ASD (0.6-0.14 S_{Ds})DL + 0.7 Ω EQ

Anchorage Design:

5/8" Hilti KB3 (2 3/4" Embed)

$V_{allowable}$: 3.41 k

$T_{allowable}$: 2.07 k

Unity EQ: 0.53 < 1.0

Equipment Weights:

Cabinet	488 lb x 1
Batteries	97 lb x 40
Breakers	14 lb x 15
Misc Wiring	200 lb
Total	4778 lb

Anchor design is completed
use only (2) anchors per
tension side due to the
proximity of the other cabinets
and the anchor spacing.

Design for 5 k weight



Quantum Consulting Engineers LLC
1511 Third Avenue, Suite 323
Seattle, WA 98101

Project: Centeris

Date: 10/9/25 Job No: 23444.01

Designer: TVM Sheet:

Client: Centeris

Checked:

⚠ This is a beta release of the new ATC Hazards by Location website. Please [contact us](#) with feedback.

ℹ The ATC Hazards by Location website will not be updated to support ASCE 7-22. [Find out why.](#)

ATC Hazards by Location

Search Information

Address: 1015 39th Ave SE Puyallup, WA 98374

Coordinates: 47.1590004, -122.2794422

Elevation: 489 ft

Timestamp: 2023-12-01T15:14:56.409Z

Hazard Type: Seismic

Reference Document: ASCE7-16

Risk Category: III

Site Class: D-default



Basic Parameters

Name	Value	Description
S _S	1.257	MCE _R ground motion (period=0.2s)
S ₁	0.433	MCE _R ground motion (period=1.0s)
S _{MS}	1.508	Site-modified spectral acceleration value
S _{M1}	* null	Site-modified spectral acceleration value
S _{DS}	1.005	Numeric seismic design value at 0.2s SA
S _{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

▼Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F _a	1.2	Site amplification factor at 0.2s
F _v	* null	Site amplification factor at 1.0s
CR _S	0.914	Coefficient of risk (0.2s)
CR ₁	0.898	Coefficient of risk (1.0s)
PGA	0.5	MCE _G peak ground acceleration
F _{PGA}	1.2	Site amplification factor at PGA
PGA _M	0.6	Site modified peak ground acceleration
T _L	6	Long-period transition period (s)
SsRT	1.257	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.375	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.433	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.483	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.5	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. [Find out why.](#)

Disclaimer

Hazard loads are provided by the U.S. Geological Survey [Seismic Design Web Services](#).

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KWIK Bolt 3 Expansion Anchor 3.3.6

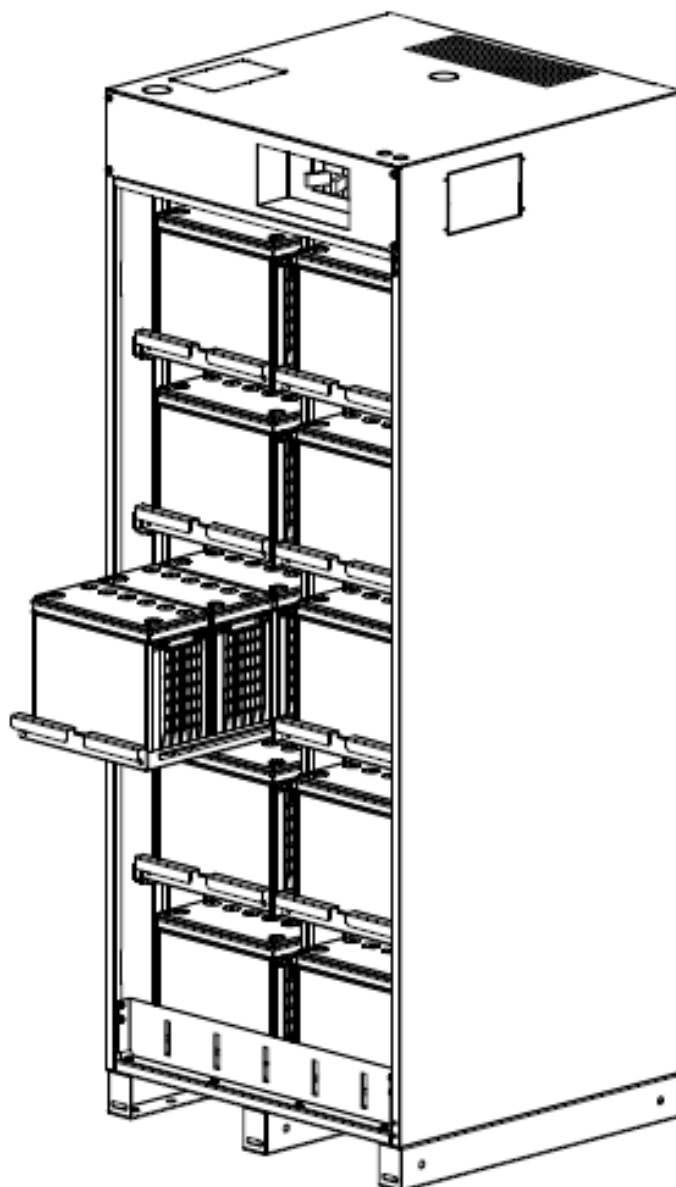
Table 6 - Carbon Steel KWIK Bolt 3 Allowable Loads in Normal-Weight Concrete¹

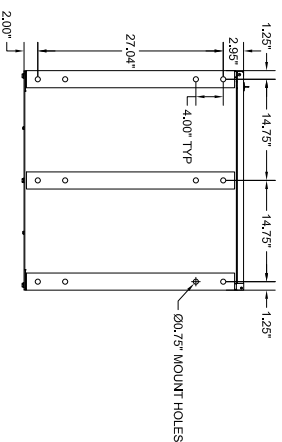
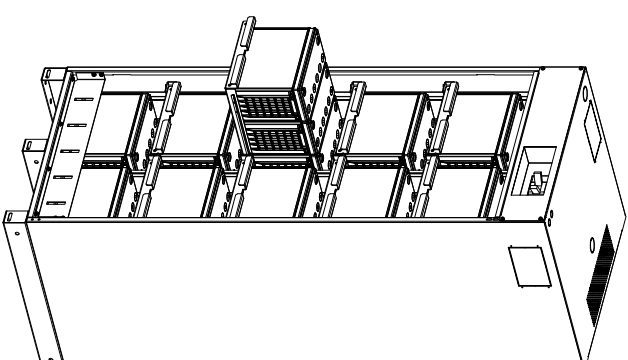
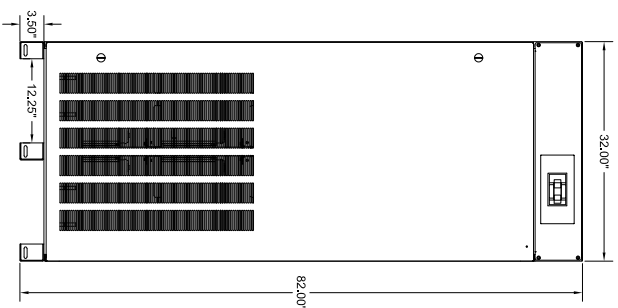
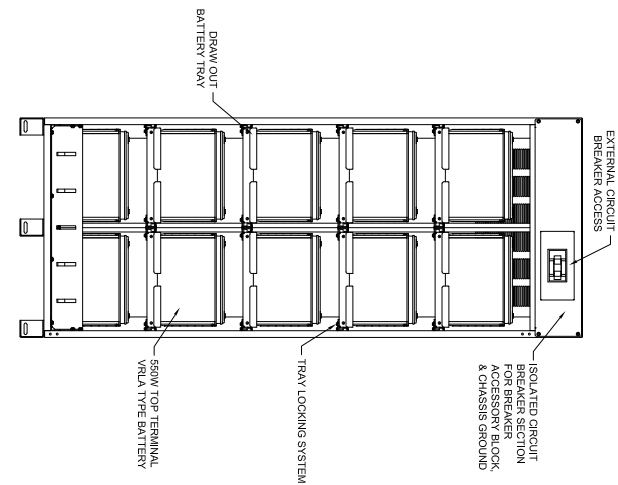
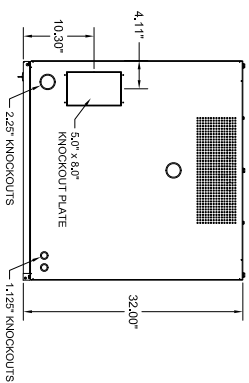
Anchor Diameter in. (mm)	Embedment Depth in. (mm)	$f'_c = 2000$ psi (13.8 MPa)		$f'_c = 3000$ psi (20.7 MPa)		$f'_c = 4000$ psi (27.6 MPa)		$f'_c = 6000$ psi (41.4 MPa)	
		Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
1/4 (6.4)	1-1/8 (29)	300 (1.3)	530 (2.4)	365 (1.6)	530 (2.4)	430 (1.9)	530 (2.4)	550 (2.4)	530 (2.4)
	2 (51)	635 (2.8)		715 (3.2)		800 (3.6)		845 (3.8)	
	3 (76)	755 (3.4)		795 (3.5)		840 (3.7)			
3/8 (9.5)	1-5/8 (41)	730 (3.2)	1135 (5.0)	910 (4.0)	1275 (5.7)	1095 (4.9)	1315 (5.8)	1090 (4.8)	1315 (5.8)
	2-1/2 (64)	1260 (5.6)	1315 (5.8)	1555 (6.9)	1315 (5.8)	1850 (8.2)		2060 (9.2)	
	3-1/2 (89)	1580 (7.0)		1770 (7.9)		1965 (8.7)		2150 (9.6)	
1/2 (12.7)	2-1/4 (57)	1235 (5.5)	1865 (8.3)	1430 (6.4)	2300 (10.2)	1620 (7.2)	2405 (10.7)	1975 (8.8)	2415 (10.7)
	3-1/2 (89)	1930 (8.6)	2415 (10.7)	2185 (9.7)	2415 (10.7)	2440 (10.9)	2415 (10.7)	3240 (14.4)	
	4-3/4 (121)	2135 (9.5)		2355 (10.5)		2575 (11.5)		3620 (16.1)	
5/8 (15.9)	2-3/4 (70)	1920 (8.5)	2750 (12.2)	2065 (9.2)	3410 (15.2)	2210 (9.8)	3785 (16.8)	2830 (12.6)	3910 (17.4)
	4 (102)	2660 (11.8)	3910 (17.4)	3020 (13.4)	3910 (17.4)	3385 (15.1)	3910 (17.4)	4770 (21.2)	
	5-1/2 (140)	3285 (14.6)		3695 (16.4)		4100 (18.2)		5325 (23.7)	
3/4 (19.1)	3-1/4 (83)	2120 (9.4)	4090 (18.2)	2425 (10.8)	4900 (21.8)	2730 (12.1)	5310 (23.6)	3785 (16.8)	5310 (23.6)
	4-3/4 (121)	3240 (14.4)	5340 (23.8)	4260 (18.9)	5340 (23.8)	5285 (23.5)	5495 (24.4)	6155 (27.4)	6225 (27.7)
	6-1/2 (165)	4535 (20.2)		5860 (26.1)		7185 (32)		7005 (31.2)	
1 (25.4)	4-1/2 (114)	3330 (14.8)	7070 (31.4)	4050 (18.0)	7600 (33.8)	4670 (20.8)	8140 (36.2)	5070 (22.6)	9200 (40.9)
	6 (152)	4930 (21.9)	9200 (40.9)	6000 (26.7)	9200 (40.9)	7070 (31.4)	9200 (40.9)	8400 (37.4)	
	9 (229)	6670 (29.7)		7670 (34.1)		8670 (38.6)		10670 (47.5)	

¹ Intermediate load values for other concrete strengths and embedments can be calculated by linear interpolation.

Cerio Project

TBC48 Battery Cabinet with 12XE1040-FR Batteries





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 REAR 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.

TBC48 BATTERY CABINET

MECHANICAL DRAWING

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DIMENSIONS ARE IN INCHES TOLERANCES:	INITIALS	DATE
	DRAWN	IDI

DECIMALS:	ANGLES:	
XY 4 43	4 40	JRL 03/21/2022
		CHECKED

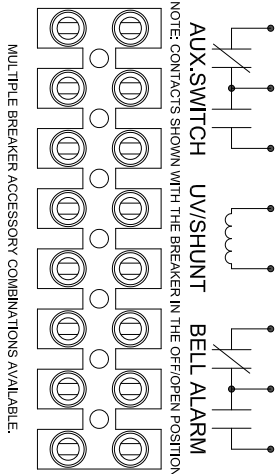
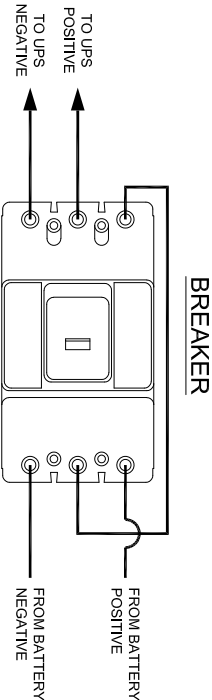
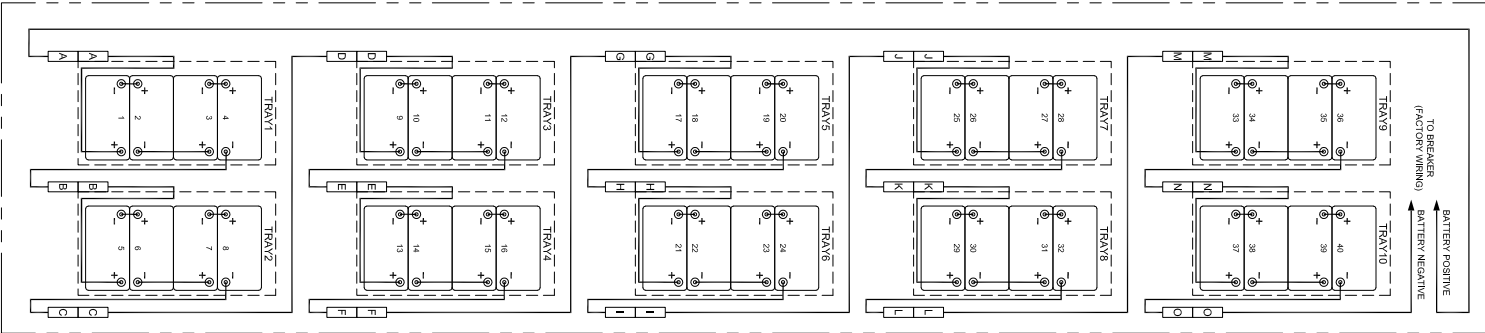
$\Delta \bar{X} = .13$	CHECKED	03/21/2022
$.XXX \pm .062$	CH	

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

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TYPICAL BATTERY WIRING



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, 800V 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

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TOLERANCES:		DRAWN	03/18/2022
DECIMALS	ANGLES	JRL	
XX.XX	°		
XX.XX	'		
XX.XX	"		
CHECKED	CH		03/18/2022
SCALE	1" = 1'		
NTS	A		

System Runtime Estimator Report

Customer Name:	C&C Power, Inc.	Prepared by:	Paul Blake
Location:	Elmhurst, IL	Phone:	630-617-9022
Project:		Date:	9/30/25
Email:	paul@ccpower.com		

Load Details

Load Value (kVA):	1500.000
Power Factor:	100.0%
Efficiency:	96.5%
Number of Cells:	240
Number of Strings:	7
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 00:06:23 [hh:mm:ss]

Estimated End of Life Runtime (EOL) is 00:03:52 [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.



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

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.



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

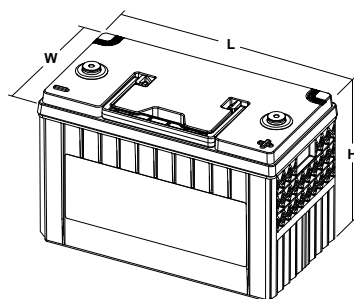
* OHSAS 18001:2007 certification not applicable to 12XE760F-FR

General Specifications

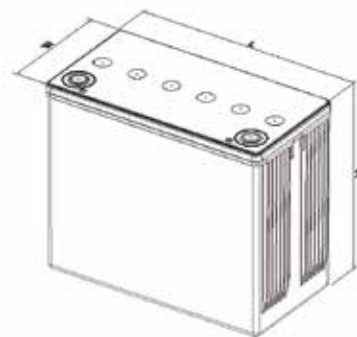
		Watts/Cell (Wpc)		Nominal Capacity (Ah)		Nominal Dimensions											
Type	Nominal Voltage (V)	5min/1.67Vpc 77°F/25°C	15min/1.67Vpc 77°F/25°C	C10/1.80Vpc 68°F/20°C	C10/1.80Vpc 68°F/20°C	Length		Width		Overall Height		Typical Weight		Short Circuit Current (A)	Internal Resistance (mΩ) ¹	Terminals	
						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:

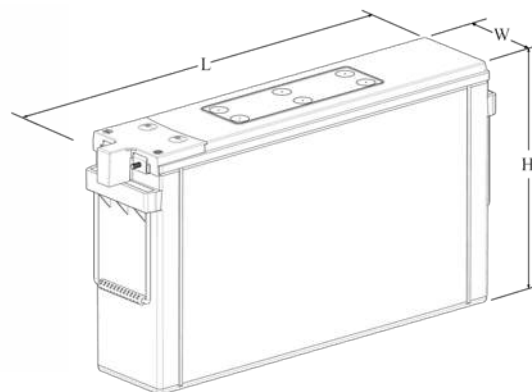
¹ Figures obtained via IEC method.



12XE760-FR



12XE1040-FR



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



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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

Product data sheet

Specifications

SQUARE D

Green Premium™



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

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

* 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 in ² (70...240 mm ²) (2 x AWG 2/0...500 kcmil) 442.54 lbf.in (50 N.m) 0.05...0.47 in ² (35...300 mm ²) (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®

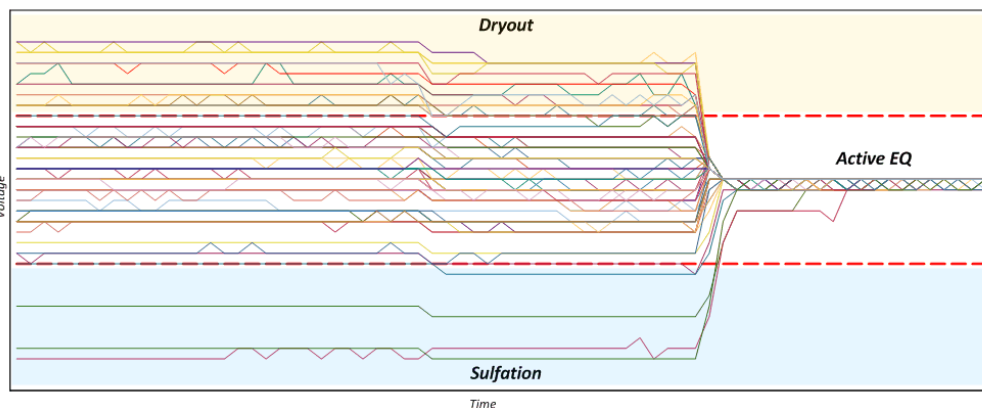
Battery Analysis and Care System 3rd Generation Battery Management System

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						String 2						String 3						String 4					
No.	Volt [V]	Temp. [°C]	Ri [mΩ]	Equalize	Status	No.	Volt [V]	Temp. [°C]	Ri [mΩ]	Equalize	Status	No.	Volt [V]	Temp. [°C]	Ri [mΩ]	Equalize	Status	No.	Volt [V]	Temp. [°C]	Ri [mΩ]	Equalize	Status
1	13.68	26.8	24.24	▲■■■	●	1	13.68	27.5	26.03	▲■■■	●	1	13.68	27.0	26.76	▲■■■	●	1	13.70	28.4	27.74	▲■■■	●
2	13.68	27.0	25.12	▲■■■	●	2	13.68	28.0	26.29	▲■■■	●	2	13.68	27.9	25.89	▲■■■	●	2	13.69	28.7	30.20	▲■■■	●
3	13.68	26.5	24.24	▲■■■	●	3	13.68	26.6	23.34	▲■■■	●	3	13.68	26.5	23.65	▲■■■	●	3	13.69	27.5	30.89	▲■■■	●
4	13.68	26.2	26.63	▲■■■	●	4	13.68	28.0	22.99	▲■■■	●	4	13.68	28.4	26.73	▲■■■	●	4	13.69	27.2	30.36	▲■■■	●
5	13.68	27.0	23.20	▲■■■	●	5	13.68	27.2	25.42	▲■■■	●	5	13.68	27.4	23.70	▲■■■	●	5	13.69	28.1	33.85	▲■■■	●
6	13.68	26.5	23.78	▲■■■	●	6	13.68	26.9	24.90	▲■■■	●	6	13.68	28.0	24.57	▲■■■	●	6	13.69	28.8	45.11	▲■■■	●
7	13.68	26.6	26.32	▲■■■	●	7	13.68	28.0	26.22	▲■■■	●	7	13.68	27.8	24.96	▲■■■	●	7	13.69	28.2	48.30	▲■■■	●
8	13.68	26.0	24.45	▲■■■	●	8	13.68	28.0	25.68	▲■■■	●	8	13.68	27.4	24.45	▲■■■	●	8	13.69	28.2	29.36	▲■■■	●
9	13.68	27.0	26.53	▲■■■	●	9	13.68	26.0	24.71	▲■■■	●	9	13.69	27.5	24.85	▲■■■	●	9	13.69	27.9	29.59	▲■■■	●
10	13.68	26.5	23.62	▲■■■	●	10	13.68	27.5	25.78	▲■■■	●	10	13.68	27.5	23.94	▲■■■	●	10	13.69	29.5	31.74	▲■■■	●
11	13.68	26.5	23.92	▲■■■	●	11	13.68	26.8	25.87	▲■■■	●	11	13.69	27.6	24.33	▲■■■	●	11	13.69	29.1	30.20	▲■■■	●
12	13.68	26.2	25.72	▲■■■	●	12	13.68	27.6	27.09	▲■■■	●	12	13.68	27.4	26.71	▲■■■	●	12	13.69	29.0	37.12	▲■■■	●
13	13.68	27.0	25.05	▲■■■	●	13	13.68	27.6	25.66	▲■■■	●	13	13.69	27.3	22.84	▲■■■	●	13	13.69	28.5	39.50	▲■■■	●
14	13.68	26.9	24.49	▲■■■	●	14	13.68	27.5	26.30	▲■■■	●	14	13.69	28.0	24.77	▲■■■	●	14	13.69	28.5	40.58	▲■■■	●
15	13.68	26.5	24.83	▲■■■	●	15	13.68	27.5	23.16	▲■■■	●	15	13.69	27.5	25.16	▲■■■	●	15	13.69	28.5	58.23	▲■■■	●
16	13.68	27.0	25.37	▲■■■	●	16	13.68	26.9	25.70	▲■■■	●	16	13.68	28.4	25.56	▲■■■	●	16	13.69	28.0	25.21	▲■■■	●
17	13.68	27.0	24.79	▲■■■	●	17	13.68	27.5	24.95	▲■■■	●	17	13.68	28.5	23.47	▲■■■	●	17	13.69	28.6	29.43	▲■■■	●
18	13.68	27.5	25.85	▲■■■	●	18	13.68	28.0	24.66	▲■■■	●	18	13.68	28.0	24.72	▲■■■	●	18	13.70	29.0	28.44	▲■■■	●
19	13.68	27.0	23.84	▲■■■	●	19	13.68	28.0	23.46	▲■■■	●	19	13.68	27.5	25.69	▲■■■	●	19	13.69	28.2	26.74	▲■■■	●
20	13.68	26.5	27.23	▲■■■	●	20	13.68	27.5	29.14	▲■■■	●	20	13.68	28.0	24.06	▲■■■	●	20	13.69	28.0	25.05	▲■■■	●
21	13.68	27.0	24.85	▲■■■	●	21	13.68	28.7	22.80	▲■■■	●	21	13.69	26.5	25.12	▲■■■	●	21	13.70	27.6	28.13	▲■■■	●
22	13.68	27.0	25.30	▲■■■	●	22	13.68	28.0	25.48	▲■■■	●	22	13.69	27.7	23.90	▲■■■	●	22	13.69	28.0	29.28	▲■■■	●
23	13.68	25.7	23.04	▲■■■	●	23	13.68	27.0	25.64	▲■■■	●	23	13.68	27.1	23.99	▲■■■	●	23	13.70	27.9	29.59	▲■■■	●
24	13.68	26.4	23.25	▲■■■	●	24	13.68	28.4	25.78	▲■■■	●	24	13.68	27.5	27.16	▲■■■	●	24	13.70	27.0	36.97	▲■■■	●
25	13.68	25.6	24.94	▲■■■	●	25	13.68	27.1	25.21	▲■■■	●	25	13.68	28.6	24.28	▲■■■	●	25	13.70	26.5	27.21	▲■■■	●
26	13.68	26.5	24.83	▲■■■	●	26	13.68	28.0	22.36	▲■■■	●	26	13.68	28.0	23.17	▲■■■	●	26	13.69	28.5	30.05	▲■■■	●
27	13.68	27.5	25.42	▲■■■	●	27	13.68	28.6	25.30	▲■■■	●	27	13.68	28.0	24.71	▲■■■	●	27	13.70	29.5	28.59	▲■■■	●
28	13.68	27.2	24.85	▲■■■	●	28	13.68	27.2	24.06	▲■■■	●	28	13.68	27.5	25.23	▲■■■	●	28	13.70	26.5	36.97	▲■■■	●
29	13.68	26.5	24.20	▲■■■	●	29	13.68	28.5	22.54	▲■■■	●	29	13.68	28.0	25.59	▲■■■	●	29	13.70	28.0	29.36	▲■■■	●
30	13.68	26.6	25.31	▲■■■	●	30	13.68	28.0	25.08	▲■■■	●	30	13.69	28.0	23.53	▲■■■	●	30	13.70	28.0	32.05	▲■■■	●
31	13.68	26.6	25.35	▲■■■	●	31	13.68	27.2	25.65	▲■■■	●	31	13.68	28.0	23.17	▲■■■	●	31	13.70	27.5	30.74	▲■■■	●
13.68 [V] Target Voltage						13.68 [V] Target Voltage						13.68 [V] Target Voltage						13.69 [V] Target Voltage					
0 [A] Current 0.00 [KW] Real Power						0 [A] Current 0.00 [KW] Real Power						0 [A] Current 0.00 [KW] Real Power						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.

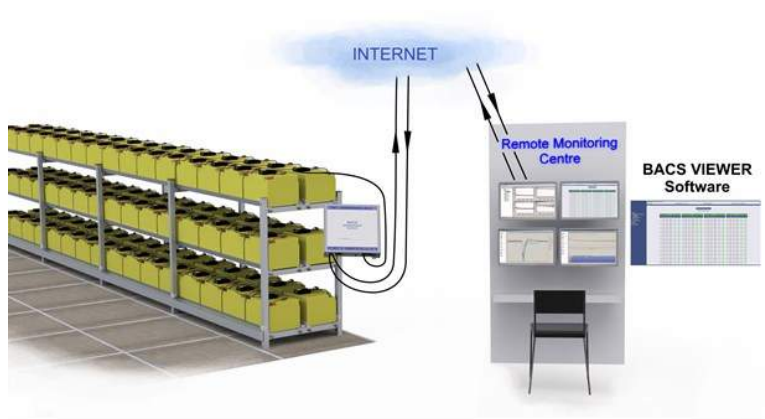
BACS® modules - Technical data

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 x 125 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)

