



Introduction to Reserve Power 2024



www.eternitytechnologies.com

About Eternity Technologies



**POWER FOR
TOMORROW
TODAY**

Founded in 2011 by Al Dobowi Group in Ras Al Khaimah UAE under leadership of Dr Mark Stevenson, **Eternity Technologies** is one of the fastest growing industrial battery companies. With state of the art global and regional manufacturing locations, Eternity Technologies is now having 2 major factories in United Arab Emirates but also operations in Germany, Spain, USA, Chile and South Africa to best serve the Motive and Reserve power markets. The company sells to over a 100 countries worldwide offering a wide range of industrial batteries and services



Our Vision :

To become the **Preferred Industrial Battery Manufacturer**

Our Mission:

To deliver the most **Reliable, Sustainable and Available Battery Solutions** to the industrial battery market.

How we do it :

Our products are made to Last longer and to have the Minimum Carbon Footprint . We have a unique global and regional manufacturing operation which allows us to have the Best Flexibility and Delivery Leadtime in the industry.

We operate under Two Business Units

Motive Power

Traction Batteries
Bloc Batteries
Chargers & Accessories
Service



To Serve Logistics , Warehousing and Mobility Applications :

- Forklift
- Pallet trucks
- AGV
- Ground support equipment
- Cleaning Machines
- Marine & Leisure
- Wheelchairs & golf carts



Reserve Power

OPZV/S Standby & Solar
FT Batteries
Solar Bloc Batteries
Lithium Modules



To Serve Energy Storage , Back Up Power and Stationary Applications :

- Telecom
- UPS
- Power Stations
- Oil & Gas
- Renewable
- Railway
- Defense



Our 2 Main Factories in UAE



Location : Ras Al Khaimah (RAK)

- Production and R&D centre
- Company formed in 2010
- Plant area – 10,000 sq meters
- Factory Manpower – 350
- Current capacity 1,800,000 2V cells per annum – Motive Power & Reserve Power



Location : Jebel Ali, TechnoPark (Dubai)

- Production centre
- Company formed in 2019
- Plant Area – 10,000 sq. meter
- Manufacturing 6V & 12V Bloc and FT Carbon Batteries –and other specialised products
- Currently extending operations to increase capacity to 500,000 blocs by the end of 2024



We have a unique Manufacturing / Assembly Set up



Manufacturing & Certifications

Product & Process designs developed from European technology:

- All production machines & processes procured from European suppliers & to world-class technology levels
- All specialised materials & components procured from Europe
- High degree of local sourcing for raw materials



The factory meets the most stringent, international standards for:

- Health & safety



- Quality



- Environmental Management



- Accredited laboratories

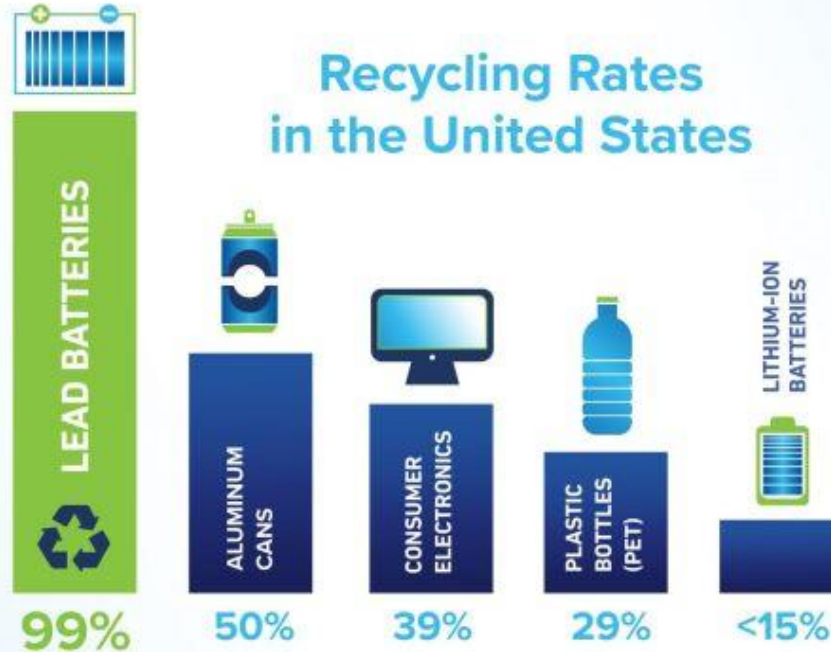


- Eternity is member of



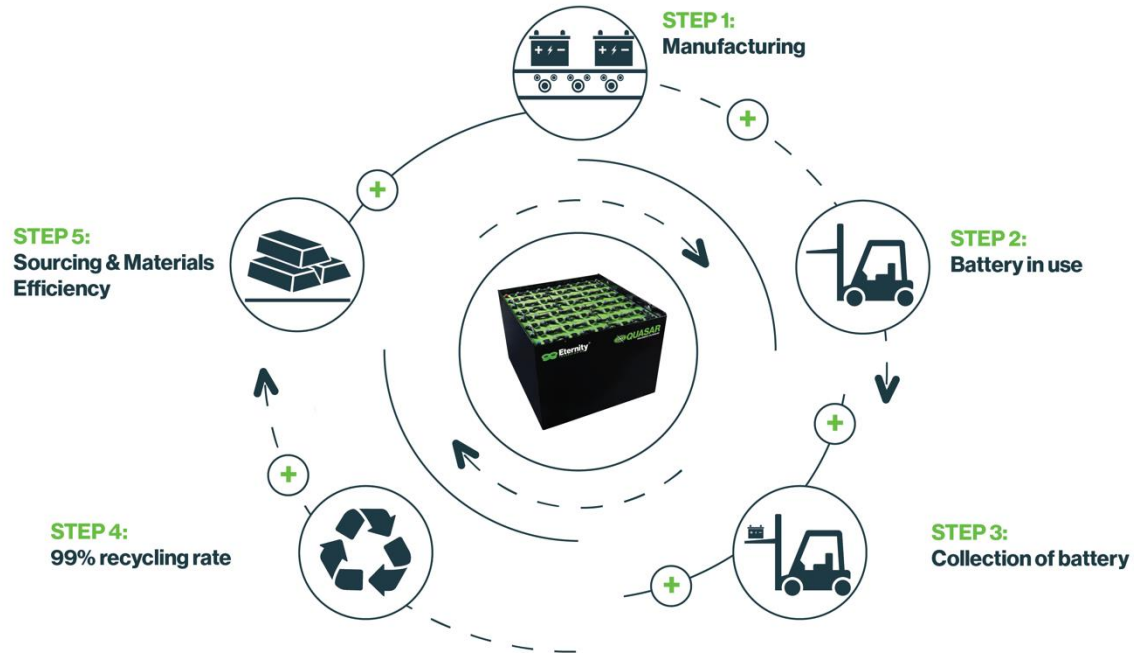
Why Lead Acid Battery ?

Lead Batteries Reign as Top Recycled Product



The Role of Eternity Batteries in Sustainable Circular Economy

Unlike other battery chemistries, all major components of Eternity lead acid battery (lead, plastic, and electrolyte) can be recycled and reused to make new batteries. They are the most recycled product in the world with an enviable 99% recycling rate...



Reserve Power - Lead Acid Battery Range

Flooded Deep Cycle

OPzS Standby



Voltage: 2V
Capacity: 100 – 3250Ah

OPzS Solar



Voltage : 2V
Capacity: 160 – 4550Ah

OGi Bloc



Voltage : 6V & 12V
Capacity: 25 – 300Ah

VRLA Gel Deep Cycle

OPzV Standby



Voltage : 2V
Capacity: 100 – 3250Ah

OPzV Solar



Voltage : 2V
Capacity: 140 – 4250Ah

Gel Solar Bloc



Voltage : 6V & 12V
Capacity: 55 – 300Ah

ETB FT



Voltage : 12V
Capacity: 100 – 200Ah

VRLA Carbon Nano

Quasar Gel



Voltage: 6V & 12V
Capacity: 81 – 361Ah

Quasar FT



Voltage : 12V
Capacity: 100 – 200Ah

QSRV



Technology: Thin Tube Carbon Nano
Voltage: 2V
Capacity: 500-3000Ah

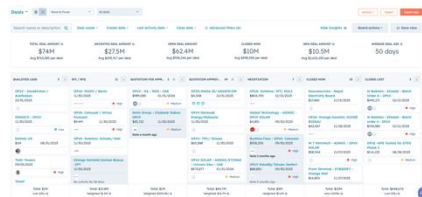
Our Roadmap is including Lithium and Premium Lead Acid



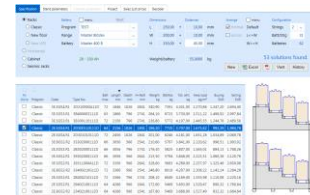
Made in UAE Rack Range



Back up Sizing Software +
Container Load Optimization



CRM



UPS Sizing / IEEE



Quasar Gel Bloc



Quasar
Carbon
Nano QSRV



Li-ion
Lithium LFP
48V
100-200Ah



QSRV Range

2022

2023

2024

Our Reserve Power Markets

Telecom

- Core Networks / Switch Sites
- Solar Base Stations
- Hybrid Genset
- Remote / Bad Grid Sites
- Submarine Cable Stations



Industrial

- Power Plants, Power Stations, Substation
- Industry automation
- Railway
- Oil, Gas Industries
- UPS



Renewable

- Energy Storage Solutions
- Home Solar / Residential
- Mini Grid



Over 500 MWh of Solar Batteries installed in 2022-23 !



Full OffGrid Solar Telecom Site



Our Reference list is expanding



Telefonica



Togocom

Taipower

ERICSSON



ExxonMobil



We keep expanding our 2V OPZV/S range



NETWORK POWER

Eternity
TECHNOLOGIES

Largest OPzV & OPzS Range in the market

We have now the largest range of 2V OPzV & OPzS totalling 128 models

- **OPzV Solar:** 10 new models have been added totalling 32 models from 140ah to 4250Ah
- **OPzV Standby:** 10 new models have been added totalling 32 ranges from 100 to 3250Ah
- **OPzS Solar:** 10 new models have been added totalling 32 ranges from 160 to 4550Ah
- **OPzV Standby:** 10 new models have been added totalling 32 ranges from 100 to 3250Ah

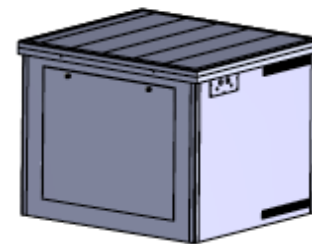
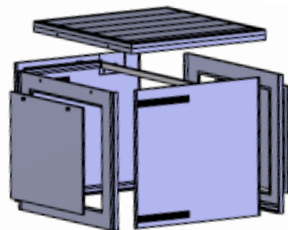
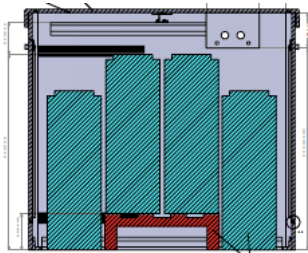
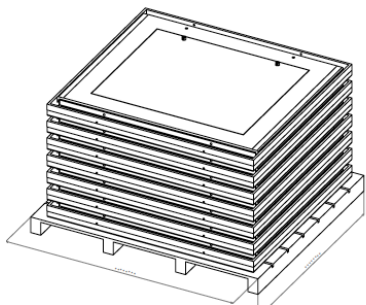
And a unique OPZS Dry / Moist Process

OPZV/S Solar Range

Cell Type Use (100%) / VPC Ref Temp	C10 1.80 25°C	C12 1.80 25°C	C20 1.80 25°C	C24 1.80 25°C	C48 1.80 25°C	C72 1.80 25°C	C100 1.85 25°C	C120 1.85 25°C	C240 1.85 25°C
2 OPzS-ET 160SOLAR	116	117	128	134	144	152	158	163	169
3 OPzS-ET 236SOLAR	174	176	192	201	216	229	237	244	254
4 OPzS-ET 316SOLAR	232	235	255	268	288	305	316	325	339
5 OPzS-ET 396SOLAR	288	293	317	335	359	381	394	407	423
6 OPzS-ET 476SOLAR	345	351	379	402	431	457	474	488	508
5 OPzS-ET 520SOLAR	412	419	453	464	465	499	519	536	557
6 OPzS-ET 626SOLAR	494	503	544	557	559	597	623	644	668
7 OPzS-ET 726SOLAR	577	586	637	650	658	697	727	747	780
6 OPzS-ET 916SOLAR	711	721	783	804	877	937	915	942	981
7 OPzS-ET 1070SOLAR	829	843	913	940	1025	1096	1069	1102	1146
8 OPzS-ET 1220SOLAR	948	961	1044	1072	1168	1249	1218	1257	1307
9 OPzS-ET 1375SOLAR	1066	1080	1174	1206	1314	1406	1371	1416	1470
10 OPzS-ET 1525SOLAR	1185	1201	1304	1340	1461	1563	1523	1571	1634
11 OPzS-ET 1680SOLAR	1303	1320	1435	1474	1607	1718	1676	1730	1796
12 OPzS-ET 1830SOLAR	1421	1441	1566	1608	1753	1875	1828	1885	1960
13 OPzS-ET 1980SOLAR	1494	1561	1645	1690	1842	1970	1921	1981	2060
11 OPzS-ET 1925SOLAR	1558	1575	1709	1754	1821	1917	1923	1983	2062
12 OPzS-ET 2100SOLAR	1700	1718	1864	1914	1987	2091	2098	2163	2250
13 OPzS-ET 2250SOLAR	1841	1861	2014	2074	2144	2266	2273	2343	2437
14 OPzS-ET 2450SOLAR	1983	2004	2168	2233	2309	2440	2448	2524	2624
15 OPzS-ET 2600SOLAR	2124	2148	2323	2393	2474	2614	2623	2704	2812
16 OPzS-ET 2800SOLAR	2266	2291	2478	2552	2639	2788	2797	2884	2999
17 OPzS-ET 3000SOLAR	2408	2434	2632	2711	2810	2962	2973	3064	3187
18 OPzS-ET 3150SOLAR	2549	2577	2787	2871	2976	3136	3148	3245	3374
19 OPzS-ET 3300SOLAR	2691	2720	2941	3030	3141	3310	3322	3425	3562
20 OPzS-ET 3500SOLAR	2833	2863	3096	3190	3306	3484	3497	3605	3749
21 OPzS-ET 3675SOLAR	2974	3008	3252	3350	3478	3660	3672	3786	3937
22 OPzS-ET 3860SOLAR	3116	3151	3407	3509	3644	3834	3847	3966	4124
23 OPzS-ET 4025SOLAR	3257	3294	3579	3688	3821	4008	4021	4146	4312
24 OPzS-ET 4200SOLAR	3399	3437	3735	3827	3987	4182	4196	4326	4499
25 OPzS-ET 4375SOLAR	3540	3580	3890	3988	4154	4356	4371	4507	4687
26 OPzS-ET 4550SOLAR	3682	3723	4046	4147	4320	4530	4546	4687	4874

Cell Type Use (100%) / VPC Ref Temp	C10 1.80 25°C	C24 1.80 25°C	C48 1.80 25°C	C72 1.80 25°C	C100 1.85 25°C	C120 1.85 25°C	C240 1.85 25°C
2 OPzV-ET 140SOLAR	110	126	127	139	137	141	146
3 OPzV-ET 210SOLAR	165	189	190	208	205	212	218
4 OPzV-ET 280SOLAR	221	252	254	278	274	282	291
5 OPzV-ET 350SOLAR	278	317	320	351	345	356	367
6 OPzV-ET 400SOLAR	326	371	375	410	404	417	430
5 OPzV-ET 500SOLAR	403	460	464	508	500	516	532
6 OPzV-ET 600SOLAR	482	550	555	608	598	618	637
7 OPzV-ET 700SOLAR	560	638	644	705	694	717	739
6 OPzV-ET 900SOLAR	691	739	794	870	856	884	912
7 OPzV-ET 1050SOLAR	806	862	927	1015	999	1031	1064
8 OPzV-ET 1200SOLAR	923	987	1061	1163	1144	1181	1218
9 OPzV-ET 1350SOLAR	1038	1111	1194	1308	1287	1329	1370
10 OPzV-ET 1500SOLAR	1149	1253	1322	1448	1425	1471	1517
11 OPzV-ET 1600SOLAR	1264	1378	1454	1593	1568	1618	1669
12 OPzV-ET 1800SOLAR	1379	1504	1586	1738	1710	1766	1821
13 OPzV-ET 1950SOLAR	1457	1588	1676	1836	1807	1865	1923
11 OPzV-ET 1800SOLAR	1433	1633	1648	1805	1776	1834	1891
12 OPzV-ET 2000SOLAR	1563	1782	1797	1969	1938	2000	2063
13 OPzV-ET 2113SOLAR	1698	1936	1953	2139	2105	2173	2241
14 OPzV-ET 2300SOLAR	1828	2084	2103	2304	2267	2340	2414
15 OPzV-ET 2438SOLAR	1959	2233	2253	2468	2429	2508	2586
16 OPzV-ET 2600SOLAR	2090	2382	2403	2633	2591	2675	2758
17 OPzV-ET 2800SOLAR	2220	2531	2553	2798	2753	2842	2931
18 OPzV-ET 2970SOLAR	2373	2706	2729	2990	2943	3038	3133
19 OPzV-ET 3135SOLAR	2505	2856	2881	3157	3107	3207	3307
20 OPzV-ET 3300SOLAR	2637	3006	3033	3323	3270	3376	3481
21 OPzV-ET 3440SOLAR	2768	3156	3183	3488	3433	3543	3654
22 OPzV-ET 3600SOLAR	2900	3306	3335	3654	3596	3712	3828
23 OPzV-ET 3786SOLAR	3032	3457	3487	3820	3760	3881	4002
24 OPzV-ET 3950SOLAR	3164	3607	3639	3987	3923	4050	4176
25 OPzV-ET 4090SOLAR	3296	3757	3790	4153	4087	4219	4351
26 OPzV-ET 4250SOLAR	3428	3908	3942	4319	4251	4388	4525

OPZV/S Easy Installation into Solar BattBox



QSRV Range – 2V Thin Tube Lead Carbon



- **High Rate Discharge** would allow more power faster



- **2X Fast Charge** vs standard battery



- **High Rate PSOC Compatibility** would allow to operate your battery at partial state of charge



- **High Temperature performance** makes it ideal for many outdoor applications



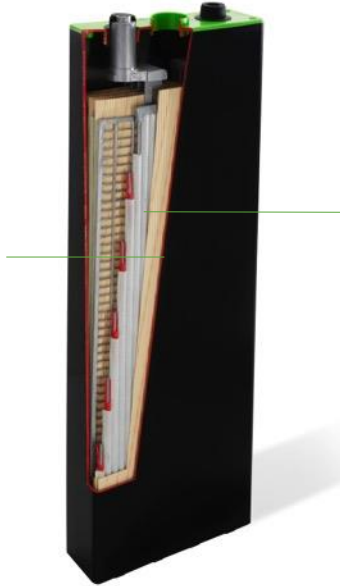
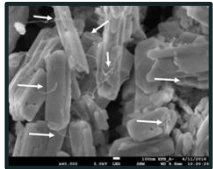
- **Increased Battery Life**
 - ✓ > 20 Year Design Life
 - ✓ Shelf life up to 2Years
 - ✓ Enhanced Cycle life > 3500 cycles

Carbon Nanotube Technology delivers greater charge acceptance and longer life vs conventional lead acid batteries

Thin Tube Lead Carbon Technology

Negative plate made with Carbon Nanotube (CNT) Technology

CNT (Carbon Nanotube) Technology is a modern alternative to activated carbon / Graphene. Carbon Nanotubes increase the negative plates fast charge capability. The Carbon Nanotubes work as conductors to the charging current and accepts charge easily with little resistance



Positive plate with Thin Tube technology

The Quasar positive plate consists of 24 thin tubes (vs 18 in conventional lead acid tubular positive plates). This results in better high rate discharge performance and greater energy density which equates to increased power and longer running times

- Enhances Consistency of Performance
- Improves Charge Acceptance and Discharge performance
- Increases Cycle Life
- Enables Partial State of Charge Operations (PSOC)
- Improves Thermal Operational Ranges

QSRV Range Summary



Model	Rated capacity Ah @C10	Box & lid material	Design Life	Shelf Life	Current Limit	Temperature Range	Cycle life
QSRV500	500	ABS	20years	2years	0.4 C	-40+55C	>3500 Cycle @50% DOD
QSRV800	800	ABS	20year	2years	0.4 C	-40+55C	>3500 Cycle @50% DOD
QSRV1000	1000	ABS	20year	2years	0.4 C	-40+55C	>3500 Cycle @50% DOD
QSRV1200	1200	ABS	20year	2years	0.4 C	-40+55C	>3500 Cycle @50% DOD
QSRV1500	1500	ABS	20year	2years	0.4 C	-40+55C	>3500 Cycle @50% DOD
QSRV2000	2000	ABS	20year	2years	0.4 C	-40+55C	>3500 Cycle @50% DOD
QSRV2500	2500	ABS	20year	2years	0.4 C	-40+55C	>3500 Cycle @50% DOD
QSRV3000	3000	ABS	20year	2years	0.4 C	-40+55C	>3500 Cycle @50% DOD
QSRV3500	3500	ABS	20year	2years	0.4 C	-40+55C	>3500 Cycle @50% DOD



INTRODUCING “QUASAR FT Range”



www.eternitytechnologies.com

NEW! QUASAR - Carbon Nano Gel Battery



Carbon Nanotube Technology delivers greater charge acceptance and longer life vs conventional lead acid batteries



- **Deep Discharge Resilience.** Gel Technology design would allow good recovery from full discharge



- **3X Fast Charge** vs standard battery.



- **High Cyclic PSOC Compatible** would deliver exceptional cyclic performance even in Partial state of charge

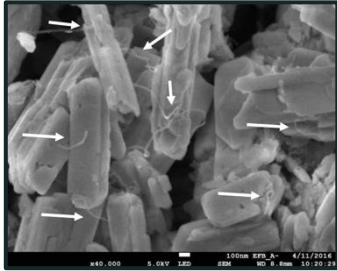
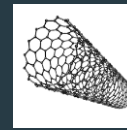


- **High Temperature performance** makes it ideal for many outdoor applications



- **Battery Life**
- Design life of 15Year
 - ✓ Shelf life up to 2Years
 - ✓ Enhanced Cycle life > 2000 cycles @ 50%

About Carbon Nano Tube Technology



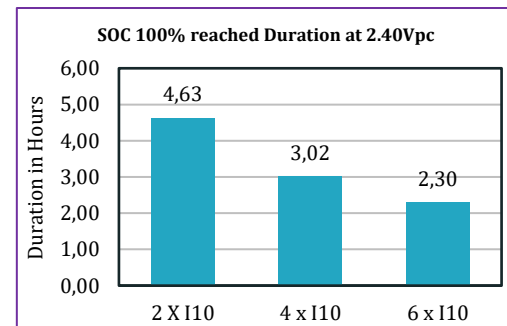
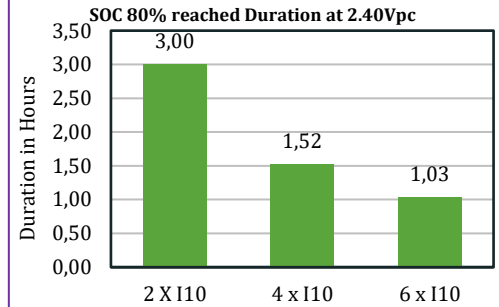
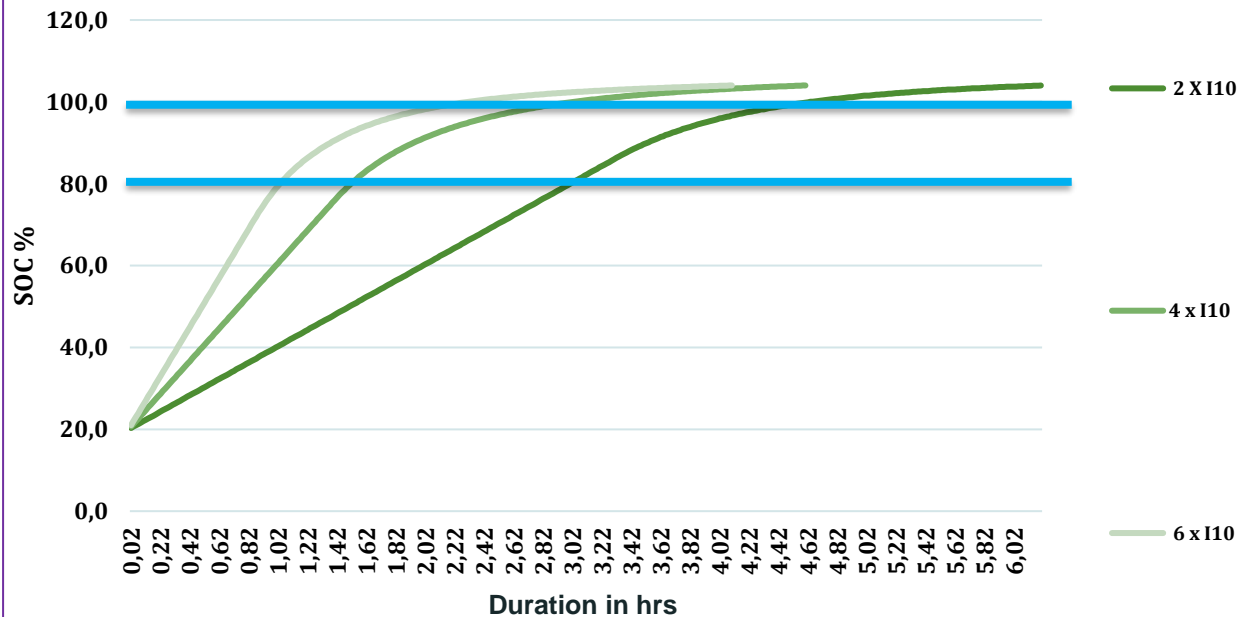
- Eternity Technologies uses patented Carbon Nano Tube in its specific battery pasting process.
- It creates a network of individual nanotubes allowing for electrons to flow with minimal resistance, as well as reinforcing the plates, adding lasting strength and durability



- Enhances Consistency of Performance
- Improves Charge Acceptance
- Increases Cycle Life
- Enables Partial State of Charge Operations (PSOC)
- Improves Thermal Operational Ranges

Our fast Charge Behaviour can be as fast as Lithium!

Recharge Behavior SOC%vs Duration - @ 2.4Vpc - Current 2 x I10 , 4 x I10 and 6 x I10



Test Report / Cycle Performance



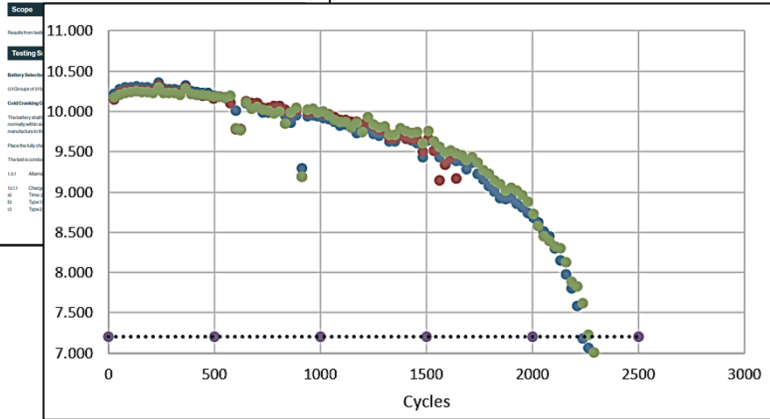
High Temperature @ High Cyclic Battery Test Gel Carbon 12V Battery

Manufacturer Statement
Eternity Technologies (Eternity) confirms that the QUASAR Gel Carbon 12V Battery has successfully passed the cycle test and design process for 2000 Cycles at 50°C and 30% DOD.

The manufacturer warrants that the manufacturer's product will meet the design and performance requirements for the intended application and use. The manufacturer is not responsible for any damage or injury caused by the use of the product in any other application or use.

Tests at an independent lab at USA EMI Electric Applications Incorporated, Texas are the basis for this statement.

Purpose
Verify Eternity QUASAR Gel Carbon 12V Battery product for use with standard EC testing equipment.



QUASAR Front Terminal Batteries Installation & Operating Guide

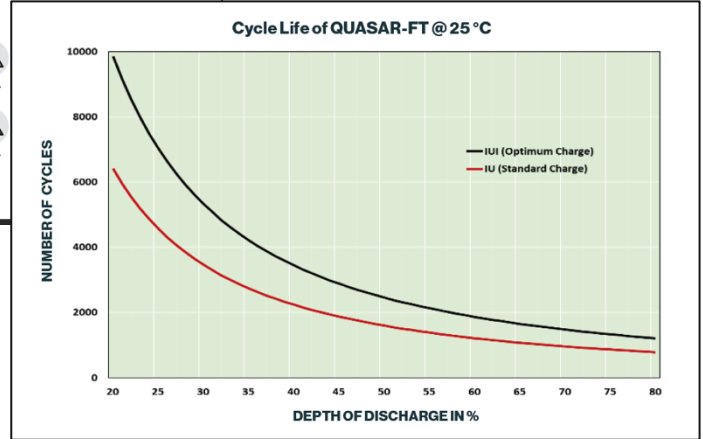
Safety Instructions

Carefully read this manual and all parts operation manual of Eternity Technologies QUASAR Front Terminal Batteries. Please refer to the latest edition of the battery room standards, effective at the moment of installation IEC 62485-2.

The QUASAR Front Terminal range are lead and battery components of a system and although they are maintenance free, they require suitable ventilation and installation and operation requirements with suitable ventilation and maintenance performance of facilities. Refer to the Installation & Operating Guide for the necessary instructions for the correct use, handling, installation and maintenance of Eternity Technologies QUASAR Front Terminal Batteries.

The non-compliance with the technical data herein may cause risks to personnel and damage to equipment as well as personal injury and loss of property. The manufacturer is not responsible for any damage or injury caused by the use of the product in any other application or use.

Based on the information provided by the manufacturer of all items and material is available in the technical manual.



- High Temp + High Cyclic Test completed in USA 3rd Party Test Lab delivering over 2000 Cycles @ 30% DOD @ 50C

Our 2 Ranges : Gel and Gel Carbon



The image shows a large, dark grey battery unit with a green top, positioned in a modern industrial warehouse. The battery is labeled 'Eternity ETB200FT'. The background features a high-ceilinged space with structural beams and bright lighting, suggesting a clean and professional manufacturing or distribution environment.

ETB Range
VRLA Gel Front Terminal Battery



The image shows a large, dark grey battery unit with a green top, positioned in front of a telecommunication tower. The battery is labeled 'Eternity QSR200FT' and 'QUASAR'. The background features a clear blue sky and a lush green landscape, suggesting a remote or outdoor application for the battery.

QUASAR™ FT Range
VRLA Gel Carbon Nano Battery



Competition - Benchmark

Network Power > Sonnenschein PowerCycle > Technical data, Applications, Dimensions



Sonnenschein PowerCycle Technical data, Applications, Dimensions

Applications

PowerCycle is ideal for countries with hot climatic conditions, particularly for emerging markets where power supply instability makes battery back-up crucial. As the latest advancement of the leading dry® Gel technology, this new battery will enable operators to reduce ongoing expenses from battery replacements, site visits, electricity and diesel costs.

Your benefits:

- > Advanced grid design for longer life at high temperatures: up to 5 years at 40°C in float operation (20 years at 20°C)
- > Fast charging - high availability
- > Exceptional cyclic performance: 1,000 cycles at 80% depth of discharge (C10, 20°C)
- > Wide operating temperature range: -40°C to +50°C
- > Excellent performance in Partial State of Charge (PSOC) operation and rough operating conditions
- > Durable Polypropylene container
- > Front terminal design with handles - Easy installation and maintenance
- > Lowest energy consumption
- > Maintenance free - no topping-up



Technical characteristics and data

Type	Part number	Nom. voltage	Capacity C ₁₀ 1.8V typ 20°C Ah	Nominal Capacity C ₁₀ 1.8V typ 20°C Ah	Length max.	Width max.	Height max.	Weight approx.	Internal resistance	Short circuit current	Terminal
PC12/180/17	NPFC120180H50MA	12	180	165	568	128	320	38.4	5.10	2432	M-M 40°

Specifications

- > Durable polypropylene container
- > Wide operating temperature range: -40°C to +50°C
- > Long shelf life: up to 2 years at 20°C without recharge
- > Proof against deep discharge
- > Designed in accordance with IEC 60896-2/1-22
- > Approval: UK (Underwriter Laboratories)
- > Design life > 12 Years - "Very Long Life" according to EUROQM® 2015 classification
- > Trouble-free transport of operational blocks, no restrictions for rail, road, sea and air transportation (SAS, DGAS, clause A57)
- > Made in Germany, ISO 9001, 14001 and OHSAS 18001 certified



*weekly equalization charging necessary

2



PowerSafe
V Front Terminal

Telecommunications

Battery Range Summary

The PowerSafe® V Front Terminal range of Valve Regulated Lead Acid (VRLA) batteries has been designed specifically for use in applications that demand the highest levels of security and reliability. The new PowerSafe® V Front Terminal platform now features proprietary Thin Plate Pure Lead (TPPL) technology which provides extended shelf life, lower corrosion and gas evolution. Designed to meet the most rigorous international standards, PowerSafe V Front Terminal batteries are recognized worldwide as a premium solution for Telecom applications.

PowerSafe V Front Terminal batteries deliver superior performance while occupying less space than conventional standby power batteries. A range of compact designs, suitable for 19" and 23" racking, provides users with the benefit of increased energy density. With all electrical connectors at the front, installation and inspection are both quicker and easier.

PowerSafe V Front Terminal batteries are designed using proven gas recombination technology which removes the need for regular water addition by controlling the evolution of hydrogen and oxygen during charging. Oxygen evolved at the positive plates diffuses through microporous separators to the negative plates, and, by a series of chemical reactions within the cell, recombines to form water. Each cell incorporates its own safety valve that allows the controlled release of gas when pressure builds up within the cell.

Features and Benefits

- Reliable TPPL technology
- Capacity range 30-190Ah
- Front terminal connections for fast and easy installation and maintenance
- Suitable for 19" and 23" racking
- UL94 V-0 flame retardant case and lid
- One year shelf life

**NOW UPGRADED TO
TPPL TECHNOLOGY
(Thin Plate Pure Lead)**



Visit us at www.enerSys.com



RESERVE
POWER

US-911-85-48 January 2016

NorthStar
an EnerSys company

northstarbattery.com

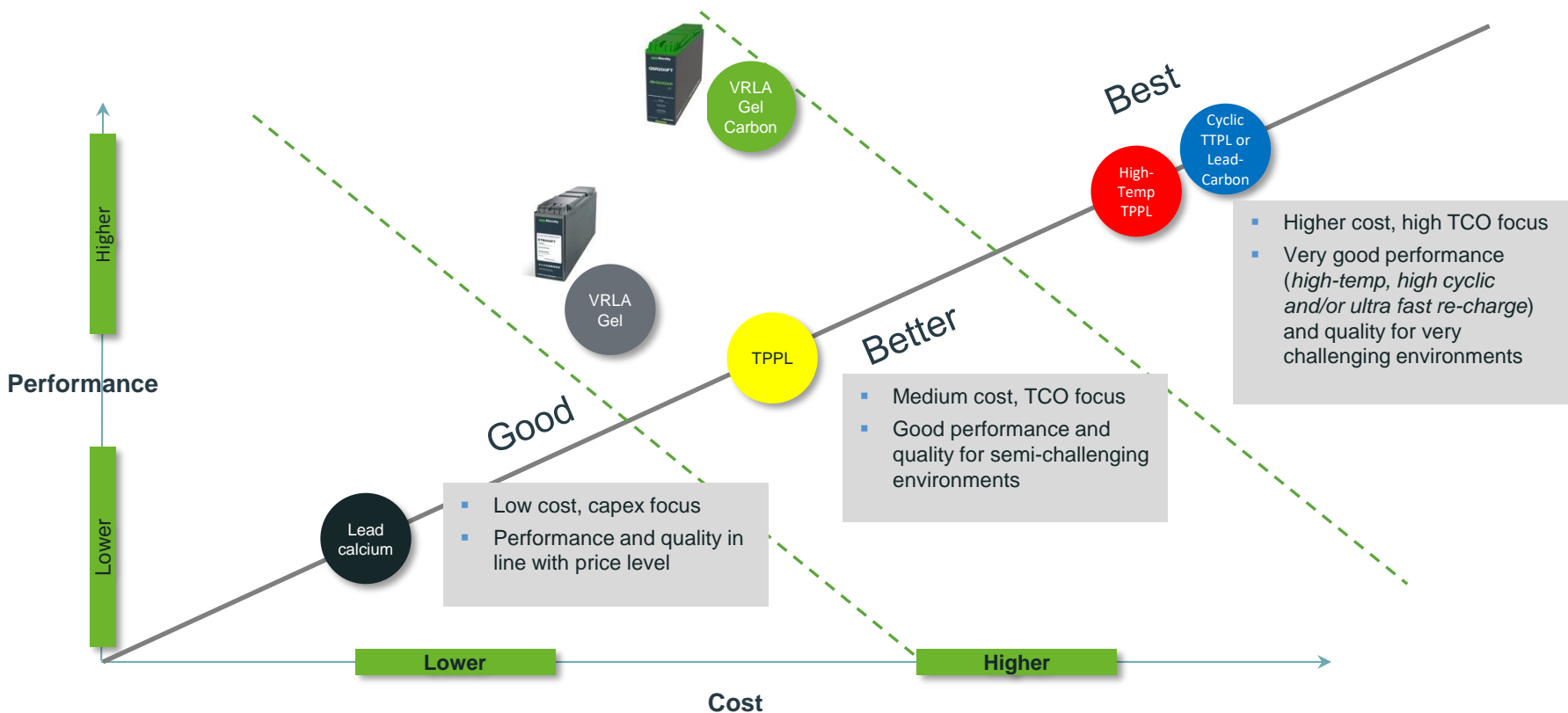
NSB BLUE+ Battery®

Thin Plate Lead Carbon







The NSB BLUE+ Battery® delivers ultra fast recharge and exceptional PSOC cycling performance.

PSOC CYCLING FASTER RECHARGE PROUDLY MADE IN USA

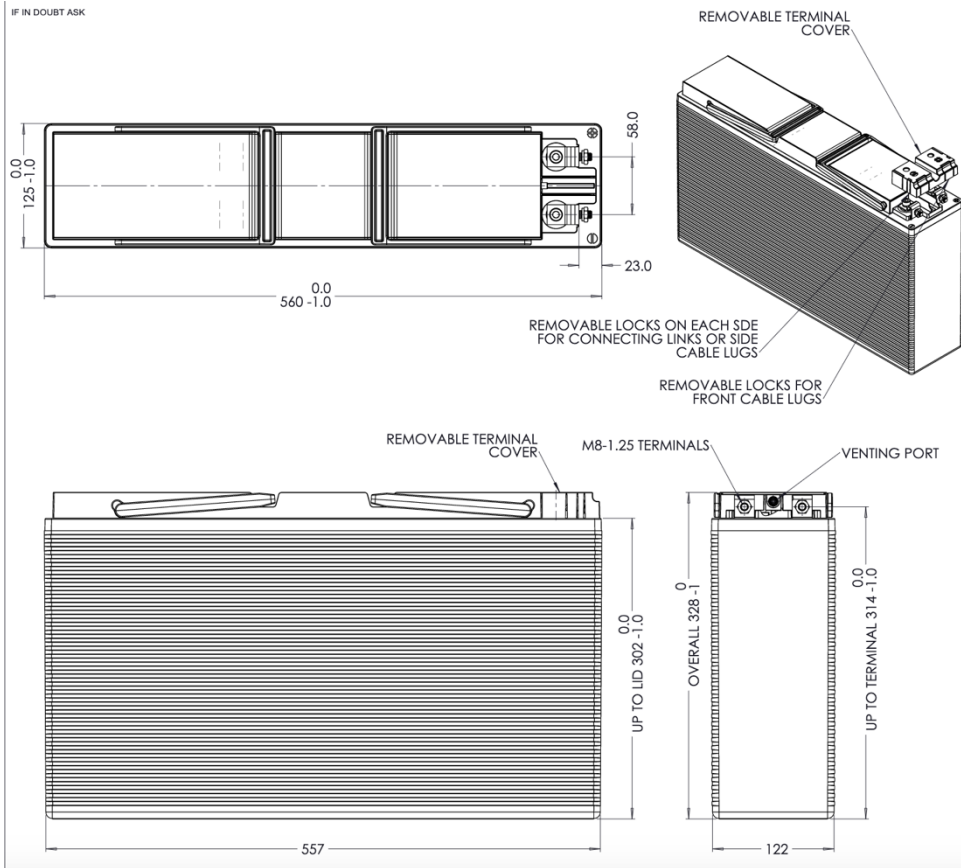
2 models with a very strong Cost vs Performance positioning



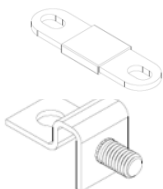
QUASAR FT Range Benchmark

	 ETB FT	 QUASAR FT	 Energys Powersafe	 Energys SBS	 NSB Blue	 Exide Powercycle
Technology	VRLA GEL	VRLA GEL CARBON NANO	VRLA TPPL	VRLA TPPL	VRLA TPLC	VRLA GEL CARBON
Cycle Life	1000 @50% DOD	>2000 cycles @ 50% DOD	800@ 50% DOD	1800 @ 50%DOD	2000@ 50% DOD	1600 cycles @ 60% DOD
Storage/Shelf Life	2 year shelf life @ 20°C	2 year shelf life @ 20°C	2 year shelf life @ 20°C	2 year shelf life	2 year shelf life @ 20°C	2 year shelf life @ 20°C Without recharge
Design Life	> 12 years EUROBAT	15 years (up to 20 Year with Catalyst)	> 12 years EUROBAT	15 year @ 20°C	12 Years	20 years
High Temp Life	3 years @ 40°C	5 years @ 40°C with Catalyst	3 Year @40c	4-5 Year @40C	Max 4 Year	5 years @ 40°C / 20 years @ 20°C
Recharge Time	4-12H	Fast Charge 2-6H	4-12H	Fast Charge 2-6H	2-4H	No Fast Charge
Operating temperature	-40 – +50°C	-40 – +55°C	-30-45C	-40 – +50°C	-40 – +55°C	-40 - +55°C
Max current	0.2C	0.4C	0.5C	0.5c	Unlimited	
PSOC Operation	No	Yes	No	Yes	Yes	Yes
Deep Cycling	Yes	Yes	No	No	YES	Yes

170-200 NEW Box Design – FT



Range and Availability



Battery type	Description	Readiness
ETB100FT	12 VRLA Gel Battery ,100Ah@C10 ABS Plastic	Q1 2024
ETB155FT	12 VRLA Gel Battery 155Ah@C10 ABS Plastic	ORDER NOW
ETB170FT	12 VRLA Gel Battery 170Ah@C10 ABS Plastic	ORDER NOW
ETB190FT	12 VRLA Gel Battery 190Ah@C10 ABS Plastic	ORDER NOW
ETB200FT	12 VRLA Gel Battery 200Ah@C10 ABS Plastic	ORDER NOW
ETB100FTV	12 VRLA Gel Battery 100Ah@C10 ABS V0 Plastic	Q1 2024
ETB155FTV	12 VRLA Gel Battery 155Ah@C10 ABS V0 Plastic	ORDER NOW
ETB170FTV	12 VRLA Gel Battery 170Ah@C10 ABS V0 Plastic	ORDER NOW
ETB190FTV	12 VRLA Gel Battery 190Ah@C10 ABS V0 Plastic	ORDER NOW
ETB200FTV	12 VRLA Gel Battery 200Ah@C10 ABS V0 Plastic	ORDER NOW
QSR100FT	12 VRLA Gel Carbon Battery 100Ah@C10 ABS Plastic	Q1 2024
QSR155FT	12 VRLA Gel Carbon Battery 155Ah@C10 ABS Plastic	ORDER NOW
QSR170FT	12 VRLA Gel Carbon Battery 170Ah@C10 ABS Plastic	ORDER NOW
QSR190FT	12 VRLA Gel Carbon Battery 190Ah@C10 ABS Plastic	ORDER NOW
QSR200FT	12 VRLA Gel Carbon Battery 200Ah@C10 ABS Plastic	ORDER NOW
QSR100FTV0	12 VRLA Gel Carbon Battery 100Ah@C10 ABS V0 Plastic	Q1 2024
QSR155FTV0	12 VRLA Gel Carbon Battery 155Ah@C10 ABS V0 Plastic	ORDER NOW
QSR170FTV0	12 VRLA Gel Carbon Battery 170Ah@C10 ABS V0 Plastic	ORDER NOW
QSR190FTV0	12 VRLA Gel Carbon Battery 190Ah@C10 ABS V0 Plastic	ORDER NOW
QSR200FTV0	12 VRLA Gel Carbon Battery 200Ah@C10 ABS V0 Plastic	ORDER NOW

Accessories Pricing

Battery kit number		
LINK100FT	COPPER RIGID CONNECTOR WITH INSULATION FOR 100AH FRONT TERMINAL BATTERY	AVAILABLE NOW
LINK200FT	COPPER RIGID CONNECTOR WITH INSULATION FOR 155/170/200AH FRONT TERMINAL BATTERY	AVAILABLE NOW
FT-ADAPT X2	COPPER TERMINAL ADAPTERS FOR FRONT TERMINAL BATTERY (2x per battery)	AVAILABLE NOW

Packaging Pricing

Packaging type		
x4 Crate	Individual crate packing to include 48V Battery string	

Example of a 48V Battery String Installation



12V 200ah
Monobloc



48V 200ah Battery
string with intercell
Link + DC
Connection



+ Insulation covers

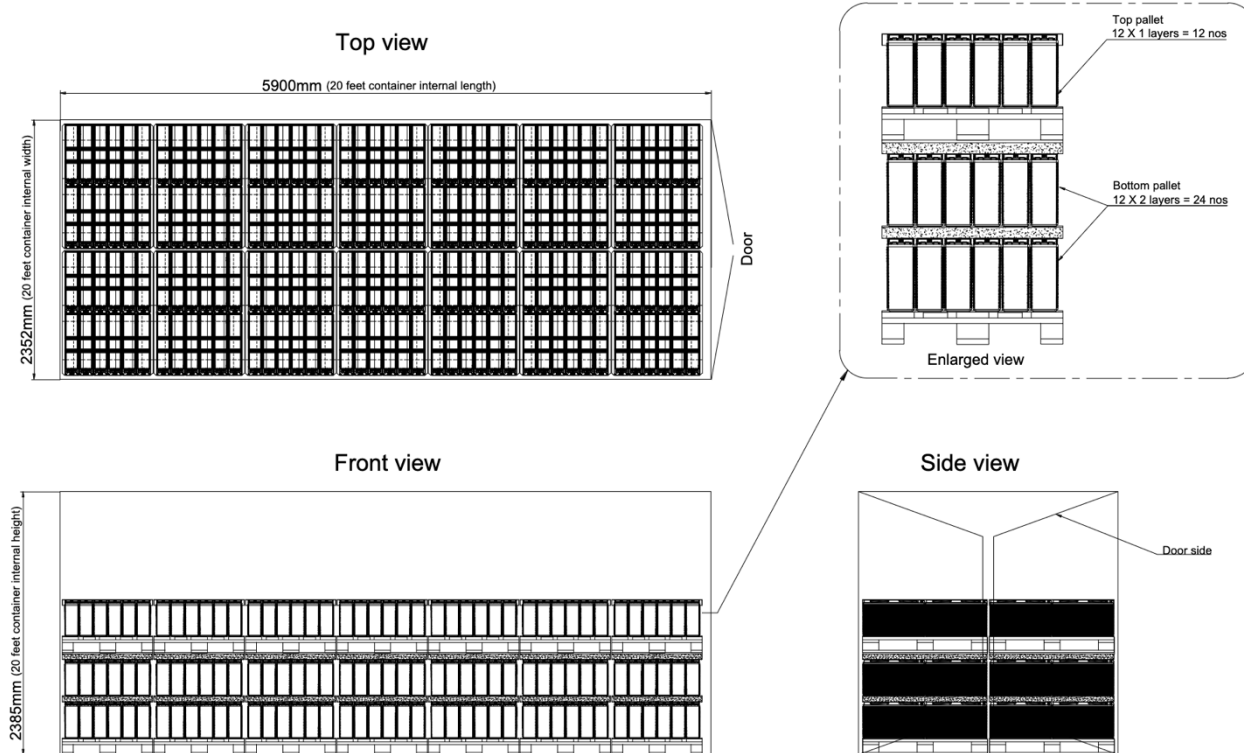


+ Venting tube /
Degassing kit

Packing / Container Load – Up to 672 Batteries per 20 Feet container!

Front terminal 155/170/200Ah batteries

20 feet container 1130*820 pallet(Maximum 28 no's 14 bottom+14 top pallets) considering maximum batteries accommodation



Battery Type	Total No. of Blocs
FT 100AH	672
FT 155AH	456
FT 170AH	420
FT 200AH	360

Documentation

QUASAR FT Brochure

RESERVE POWER **Eternity**
TECHNOLOGIES

QUASAR[®] FT Range
VRLA Gel Carbon Nano Battery

HIGH ENERGY ON DEMAND™

QUASAR[®] FT Range

With an extensive product range available, Eternity Technologies prides itself on world-class product design, production processes, technical development, cost structure and globalization.

Features:

- High Energy Density
- Long Life Cycle
- Wide Temperature Range
- Low Self-Discharge
- High Reliability
- Low Maintenance
- Wide Voltage Range
- High Power Capability
- Wide Depth of Discharge
- Wide Operating Temperature Range
- Wide Voltage Range
- High Power Capability
- Wide Depth of Discharge
- Wide Operating Temperature Range

Standards:

- IEC 60896-2
- IEC 60951
- IEC 60952
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- IEC 60958
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- IEC 61198
- IEC 61199
- IEC 61200

Applications:

- UPS Systems
- Telecommunications
- Transportation
- Medical

VRLA Gel Carbon Nano Battery Construction

Positive Electrolyte

Carbon Nano Technology

Separator

Specifications...

Model	Capacity (Ah)	Weight (kg)	Dimensions (mm)	Terminal Type	Operating Temp. (°C)	Self-Discharge (%)	Depth of Discharge (%)	Life Cycle (cycles)
QSR200FT	200	10.5	190x190x170	Terminal A	-20 to 55	3	80	1000
QSR300FT	300	15.5	240x240x170	Terminal A	-20 to 55	3	80	1000
QSR400FT	400	20.5	290x290x170	Terminal A	-20 to 55	3	80	1000
QSR500FT	500	25.5	340x340x170	Terminal A	-20 to 55	3	80	1000
QSR600FT	600	30.5	390x390x170	Terminal A	-20 to 55	3	80	1000
QSR700FT	700	35.5	440x440x170	Terminal A	-20 to 55	3	80	1000
QSR800FT	800	40.5	490x490x170	Terminal A	-20 to 55	3	80	1000
QSR900FT	900	45.5	540x540x170	Terminal A	-20 to 55	3	80	1000
QSR1000FT	1000	50.5	590x590x170	Terminal A	-20 to 55	3	80	1000

Outline Drawings

Terminal Option

A global leader in the industrial battery market providing world-class products for Motive Power and Reserve Power applications.

Eternity

QUASAR FT Datasheets

RESERVE POWER **Eternity**

QSR200FT
VRLA Gel Carbon Nano Battery

Performance characteristics

Features

Dimensions and weight

Applications

RESERVE POWER **Eternity**

Discharge Tables at 25°C (77°F)

Current Rates

Rate	1hr	2hr	3hr	4hr	5hr	6hr	7hr	8hr	9hr	10hr	12hr	15hr	20hr	25hr	30hr	35hr	40hr	45hr	50hr	60hr	70hr	80hr	90hr	100hr
Capacity (Ah)	200	190	180	170	160	150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	5	3	2	1

Capacity (Ah)

Rate	1hr	2hr	3hr	4hr	5hr	6hr	7hr	8hr	9hr	10hr	12hr	15hr	20hr	25hr	30hr	35hr	40hr	45hr	50hr	60hr	70hr	80hr	90hr	100hr
Capacity (Ah)	200	190	180	170	160	150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	5	3	2	1

Power (Watt-hour)

Rate	1hr	2hr	3hr	4hr	5hr	6hr	7hr	8hr	9hr	10hr	12hr	15hr	20hr	25hr	30hr	35hr	40hr	45hr	50hr	60hr	70hr	80hr	90hr	100hr
Power (Wh)	20000	19000	18000	17000	16000	15000	14000	13000	12000	11000	10000	9000	8000	7000	6000	5000	4000	3000	2000	1000	500	300	200	100

QUASAR FT Installation Manual

Eternity

QUASAR Front Terminal Batteries
Installation & Operating Guide

Safety Instructions

Caution

Warning

Danger

Explosion

Flammable

Toxic

Corrosive

High Voltage

Low Voltage

High Temperature

Low Temperature

High Humidity

Low Humidity

High Altitude

Low Altitude

High Pressure

Low Pressure

High Speed

Low Speed

High Frequency

Low Frequency

High Power

Low Power

High Current

Low Current

High Voltage

Low Voltage

High Temperature

Low Temperature

High Humidity

Low Humidity

High Altitude

Low Altitude

High Pressure

Low Pressure

High Speed

Low Speed

High Frequency

Low Frequency

High Power

Low Power

High Current

Low Current

QUASAR FT Labels

Eternity

QSR200FT

QUASAR

VRLA GEL CARBON NANO BATTERY

Capacity
200Ah (20hr rate, 25°C)

Terminal Type
Terminal A

Charge Voltage
13.8V (25°C)

Maintenance Free

Documentation

FT Brochure

RESERVEPOWER
Eternity
ETB Range
VRLA Gel Front Terminal Battery
POWER FOR TOMORROW TODAY

VRLA Gel Front Terminal Battery

With an extensive product range available, Eternity Technology provides itself as world-class product design, product processes, technical development, cost structure and global location.

Features...

- Max. operating temperature: 50°C (122°F)
- Max. storage temp.: 40°C (104°F)
- Capacity: 50-1000Ah
- Deep Cycle: 80%
- Low Self-Discharge
- Wide Operating Temperature Range: -30°C (-22°F) to 50°C (122°F)

Standards

- UL1684, UL1973, IEEE1575, IEC60896-2
- EN50272-2, EN50598, EN50629, EN50630, EN50631, EN50632, EN50633, EN50634, EN50635, EN50636, EN50637, EN50638, EN50639, EN50640, EN50641, EN50642, EN50643, EN50644, EN50645, EN50646, EN50647, EN50648, EN50649, EN50650, EN50651, EN50652, EN50653, EN50654, EN50655, EN50656, EN50657, EN50658, EN50659, EN50660, EN50661, EN50662, EN50663, EN50664, EN50665, EN50666, EN50667, EN50668, EN50669, EN50670, EN50671, EN50672, EN50673, EN50674, EN50675, EN50676, EN50677, EN50678, EN50679, EN50680, EN50681, EN50682, EN50683, EN50684, EN50685, EN50686, EN50687, EN50688, EN50689, EN50690, EN50691, EN50692, EN50693, EN50694, EN50695, EN50696, EN50697, EN50698, EN50699, EN50700, EN50701, EN50702, EN50703, EN50704, EN50705, EN50706, EN50707, EN50708, EN50709, EN50710, EN50711, EN50712, EN50713, EN50714, EN50715, EN50716, EN50717, EN50718, EN50719, EN50720, EN50721, EN50722, EN50723, EN50724, EN50725, EN50726, EN50727, EN50728, EN50729, EN50730, EN50731, EN50732, EN50733, EN50734, EN50735, EN50736, EN50737, EN50738, EN50739, EN50740, EN50741, EN50742, EN50743, EN50744, EN50745, EN50746, EN50747, EN50748, EN50749, EN50750, EN50751, EN50752, EN50753, EN50754, EN50755, EN50756, EN50757, EN50758, EN50759, EN50760, EN50761, EN50762, EN50763, EN50764, EN50765, EN50766, EN50767, EN50768, EN50769, EN50770, EN50771, EN50772, EN50773, EN50774, EN50775, EN50776, EN50777, EN50778, EN50779, EN50780, EN50781, EN50782, EN50783, EN50784, EN50785, EN50786, EN50787, EN50788, EN50789, EN50790, EN50791, EN50792, EN50793, EN50794, EN50795, EN50796, EN50797, EN50798, EN50799, EN50800, EN50801, EN50802, EN50803, EN50804, EN50805, EN50806, EN50807, EN50808, EN50809, EN50810, EN50811, EN50812, EN50813, EN50814, EN50815, EN50816, EN50817, EN50818, EN50819, EN50820, EN50821, EN50822, EN50823, EN50824, EN50825, EN50826, EN50827, EN50828, EN50829, EN50830, EN50831, EN50832, EN50833, EN50834, EN50835, EN50836, EN50837, EN50838, EN50839, EN50840, EN50841, EN50842, EN50843, EN50844, EN50845, EN50846, EN50847, EN50848, EN50849, EN50850, EN50851, EN50852, EN50853, EN50854, EN50855, EN50856, EN50857, EN50858, EN50859, EN50860, EN50861, EN50862, EN50863, EN50864, EN50865, EN50866, EN50867, EN50868, EN50869, EN50870, EN50871, EN50872, EN50873, EN50874, EN50875, EN50876, EN50877, EN50878, EN50879, EN50880, EN50881, EN50882, EN50883, EN50884, EN50885, EN50886, EN50887, EN50888, EN50889, EN50890, EN50891, EN50892, EN50893, EN50894, EN50895, EN50896, EN50897, EN50898, EN50899, EN50900, EN50901, EN50902, EN50903, EN50904, EN50905, EN50906, EN50907, EN50908, EN50909, EN50910, EN50911, EN50912, EN50913, EN50914, EN50915, EN50916, EN50917, EN50918, EN50919, EN50920, EN50921, EN50922, EN50923, EN50924, EN50925, EN50926, EN50927, EN50928, EN50929, EN50930, EN50931, EN50932, EN50933, EN50934, EN50935, EN50936, EN50937, EN50938, EN50939, EN50940, EN50941, EN50942, EN50943, EN50944, EN50945, EN50946, EN50947, EN50948, EN50949, EN50950, EN50951, EN50952, EN50953, EN50954, EN50955, EN50956, EN50957, EN50958, EN50959, EN50960, EN50961, EN50962, EN50963, EN50964, EN50965, EN50966, EN50967, EN50968, EN50969, EN50970, EN50971, EN50972, EN50973, EN50974, EN50975, EN50976, EN50977, EN50978, EN50979, EN50980, EN50981, EN50982, EN50983, EN50984, EN50985, EN50986, EN50987, EN50988, EN50989, EN50990, EN50991, EN50992, EN50993, EN50994, EN50995, EN50996, EN50997, EN50998, EN50999, EN51000

Applications

- UPS
- Telecom
- Transportation
- Energy Storage
- Medical

Technology

Positive Inexpensive
Advanced carbon technology provides superior performance and longer life.

Negative
High purity lead provides superior performance and longer life.

Pressure-Release Valve
Prevents excessive internal pressure build-up, ensuring safe operation.

Outline & IAT
Meets or exceeds industry standards for performance and safety.

Separator
High purity polyethylene separator provides superior performance and longer life.

Model	Capacity (Ah)	Dimensions (mm)	Weight (kg)
ETB200FT	200	240 x 133 x 100	11.5
ETB300FT	300	240 x 133 x 133	16.5
ETB400FT	400	240 x 133 x 167	21.5
ETB500FT	500	240 x 133 x 200	26.5
ETB600FT	600	240 x 133 x 234	31.5
ETB700FT	700	240 x 133 x 267	36.5
ETB800FT	800	240 x 133 x 301	41.5
ETB900FT	900	240 x 133 x 334	46.5
ETB1000FT	1000	240 x 133 x 368	51.5

Specifications

For detailed technical specifications, please refer to the product datasheet.

Outline Drawings
ETB Front Terminal Battery

Terminal Option
Terminal Block, FT Adapter

A global leader in the industrial battery market providing world-class products for Motive Power and Reserve Power applications.

Eternity
ETB200FT

FT Datasheets

ETB200FT VRLA Gel Front Terminal Battery

Performance characteristics

Capacity	200Ah
Max. Operating Temp.	50°C (122°F)
Max. Storage Temp.	40°C (104°F)
Deep Cycle Discharge	80%
Self-Discharge Rate	3% per month at 25°C
Operating Temp. Range	-30°C to 50°C
Max. Charge Current	20A
Max. Discharge Current	10A

Dimensions and weight

Length	240mm
Width	133mm
Height	100mm
Weight	11.5kg

Applications

- UPS
- Telecom
- Transportation
- Energy Storage
- Medical

Installation Manual

Standard Front Terminal Batteries Installation & Operating Guide

Safety Instructions

- Caution: Do not short circuit the battery terminals.
- Do not dispose of the battery in fire.
- Do not dispose of the battery in water.
- Do not dispose of the battery in landfills.
- Do not dispose of the battery in incinerators.
- Do not dispose of the battery in oceans.
- Do not dispose of the battery in rivers.
- Do not dispose of the battery in streams.
- Do not dispose of the battery in lakes.
- Do not dispose of the battery in ponds.
- Do not dispose of the battery in canals.
- Do not dispose of the battery in ditches.
- Do not dispose of the battery in valleys.
- Do not dispose of the battery in fields.
- Do not dispose of the battery in woods.
- Do not dispose of the battery in mountains.
- Do not dispose of the battery in hills.
- Do not dispose of the battery in plains.
- Do not dispose of the battery in deserts.
- Do not dispose of the battery in tundra.
- Do not dispose of the battery in taiga.
- Do not dispose of the battery in boreal forest.
- Do not dispose of the battery in deciduous forest.
- Do not dispose of the battery in coniferous forest.
- Do not dispose of the battery in mixed forest.
- Do not dispose of the battery in savanna.
- Do not dispose of the battery in grassland.
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- Do not dispose of the battery in highland.
- Do not dispose of the battery in plateau.
- Do not dispose of the battery in mesa.
- Do not dispose of the battery in butte.
- Do not dispose of the battery in cliff.
- Do not dispose of the battery in canyon.
- Do not dispose of the battery in gorge.
- Do not dispose of the battery in ravine.
- Do not dispose of the battery in draw.
- Do not dispose of the battery in gulch.
- Do not dispose of the battery in wash.
- Do not dispose of the battery in arroyo.
- Do not dispose of the battery in cañon.
- Do not dispose of the battery in barranca.
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- Do not dispose of the battery in cañon.
- Do not dispose of the battery in barranca.
- Do not dispose of the battery in badland.

FT Labels

ETB200FT VRLA GEL FRONT TERMINAL BATTERY

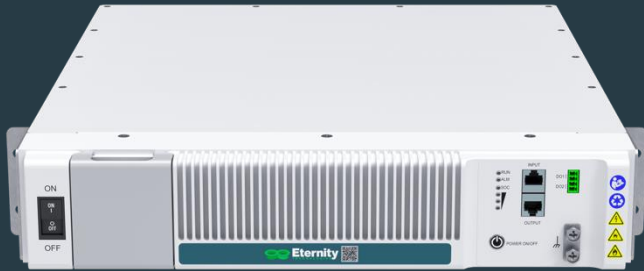
Capacity: 200Ah @ 25°C (77°F)

Terminal Torque: 10Nm

Charge Voltage: 2.35V per cell

Maintenance Free

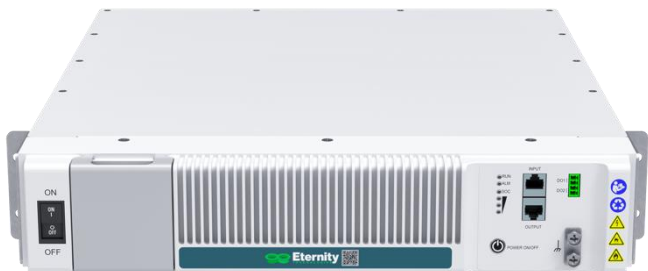
POWER FOR TOMORROW TODAY



Lithium Battery

www.eternitytechnologies.com

NEW! IBUE-48100 Lithium Battery



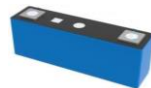
IBUE-48100 LFP 19" 2U 100Ah

Ultra compact 2U 4.8KWh

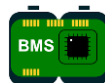
European design

First 2U 19" LFP Design in the market

Easy expansion with auto address assignment



Technology : Lithium Iron Phosphate (LFP) Prismatic cell design



Advanced Battery Management System with Dual Safety layer Over Charge protection & Anti Theft functions



Remote real-time monitor of battery SoC/SoH/Alarms



Battery Life

Design life of 15 Year -

Cycle life > 4000 cycles @ 80%

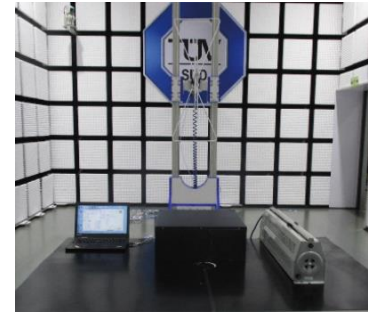


100% Standard Compliance

Electrical Safety, EMC, ROHS, CE, Transportation. US/UL Certified

Eternity Technologies & Lithium

- Eternity Technologies have signed a strategic Partnership Agreement to Produce and distribute Premium Lithium modules
- R&D and Product support will be in Europe
- Eternity Technologies Lithium Modules will be produced in China or assembled in one of our Eternity Factories (USA, Europe, UAE)



We are introducing Premium Lithium 48V Module



Standard Lithium product



Eternity Premium Lithium

1200mm height, 19" power cabinet



20U



20U

75% more energy

100 Ah 4U vs. 2U LFP batteries

400Ah/48V

700Ah/48V

Eternity Lithium Battery Range

- 19-inch design and unique outlook
- Easy and safe install, up to 16 in parallel
- Anti-theft feature
- Easy expansion with auto address assignment during parallel connection
- Natural heat dissipation design
- Remote real-time monitoring
- Max discharge current 100A
- Current limit function if higher charge current than 50A

IBUE-48100 (100 Ah) 2U



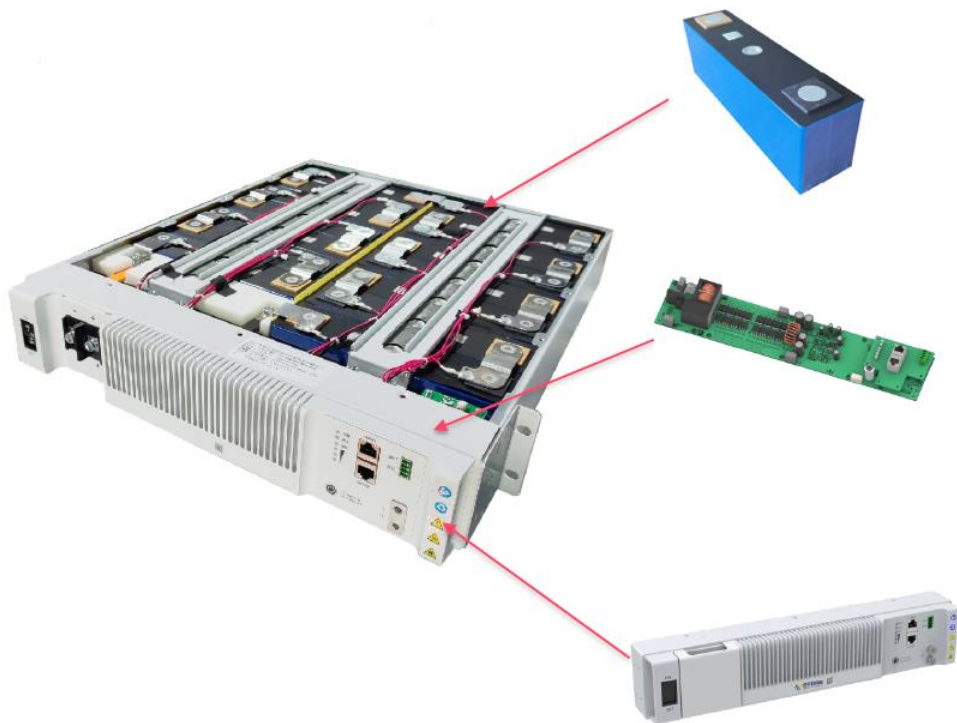
IBUE-48150 (150 Ah) 3.5U



IBUE-48200 (200 Ah) 4.5U



Battery Design



Battery cell
15*3.2V/100Ah

BMS
Supervision and control
Anti-theft alarm (>30° tilt)

Front panel
Anti corrosion

Specification Summary

		IBUE-48100	IBUE-48150	IBUE-48200	Common
Lithium chemistry					(LFP) Lithium Iron Phosphate
Nominal voltage					48V
Rated capacity		100	150	200	Ah (@ 25°C)
Rated energy		4800	7200	9600	Wh
Cycle life					≤ 4000 (Cycles @ 25°C, 80% DOD)
Calendar life					≤ 15 years
Communication interface					RS485
Cabinet rack size		2U	3.5U	4.5U (appr.)	19"
Dimensions	Width	483 (446)			mm
	Height	87.5	162	200	mm
	Depth	550 (460.5)			mm
Protection level					IP20
Weight		39.6	58	80 appr.	kg
Standard (Maximum) charge voltage					54.0 V (54.75V)
Maximum charge current					50 A
Charge current limit function					10A
Maximum discharge current					100 A
End of discharge voltage					40.5 V
Charge temperature					0°C to +55°C
Discharge temperature					-20°C to +55°C
Storage temperature					-20°C to +55°C
Standards	CB				IEC/EN 62368-1, IEC/EN 62619
	EMC				ETSI EN 300 386 (<3 m cables)
	CE				EMC Directive 2014/30/EU RoHS Directive 2011/65/EU
	Transport				UN38.3

Compliance – Safety Standards

- IEC 62619 Safety cells/batteries for industrial applications
- IEC 62368-1 Electrical safety
- ETSI 300 386 EMC, safety
- CE RoHS Directive 2011/65/EU
- UN 38.3 DG Transportation



ETSI 300 386 EMC



IEC 62368-1



IEC 62619



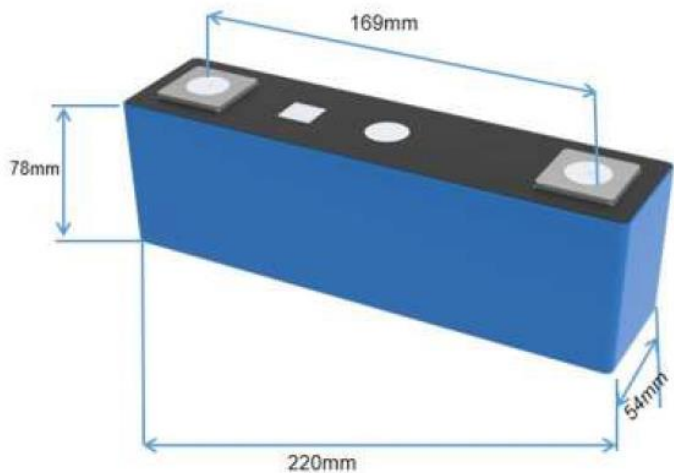
ROSH



UN 38.8

IBUE-48100 will be UL 1973 ed. 3 certified during Q1 2024.

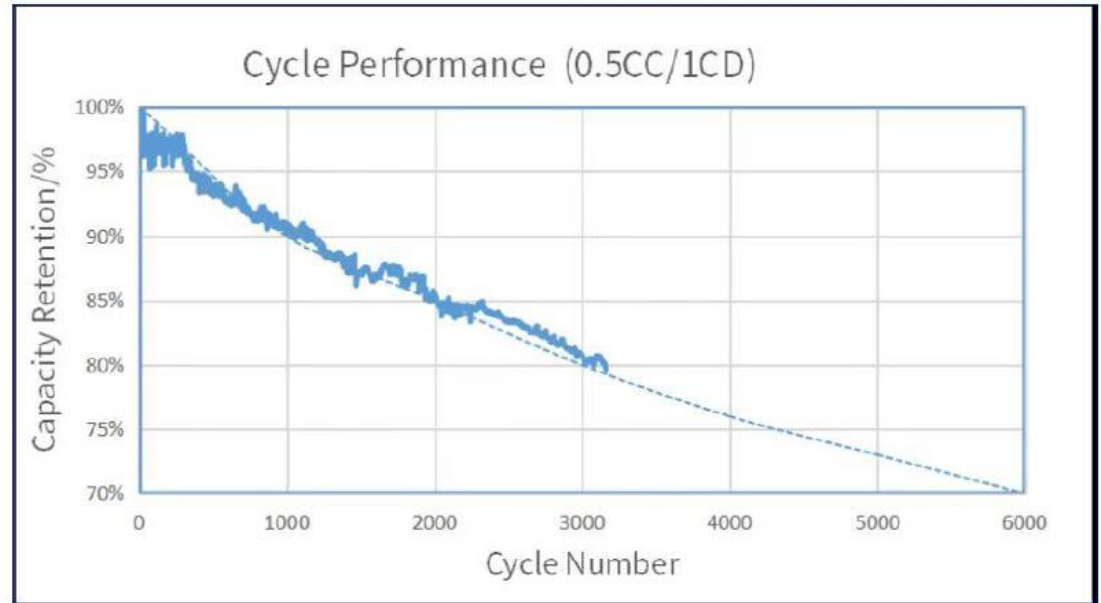
Eternity Lithium is based on World first 2U LFP Module



TECHNICAL SPECIFICATION		
Model	IFP5422078-100Ah	
Cell type	Lithium Iron Phosphate (LFP)	
Dimension	220*54*79 (WDH, mm)	
Weight	1.9+/-0.15kg	
AC internal resistance (AC 1kHz)	0.20~0.60 mΩ	
Rated voltage	3.2V	
Rated capacity	100Ah	
Standard charge method	CC-CV, 0.5C, 3.65V, 5A cut-off	
Charge current	Rated	50A
	MAX	100A
Discharge	Cut-off voltage	2.5V, T>0°C
		2.0V T≤0°C
Discharge capacity	Rated (0.5C)	≥100Ah
	MAX (1C)	≥100Ah
Life	≥6000 cycles, 0.5CC/1CD, 25°C	
Standards	IEC62619, UL1973, UL9540A, UN38.3	

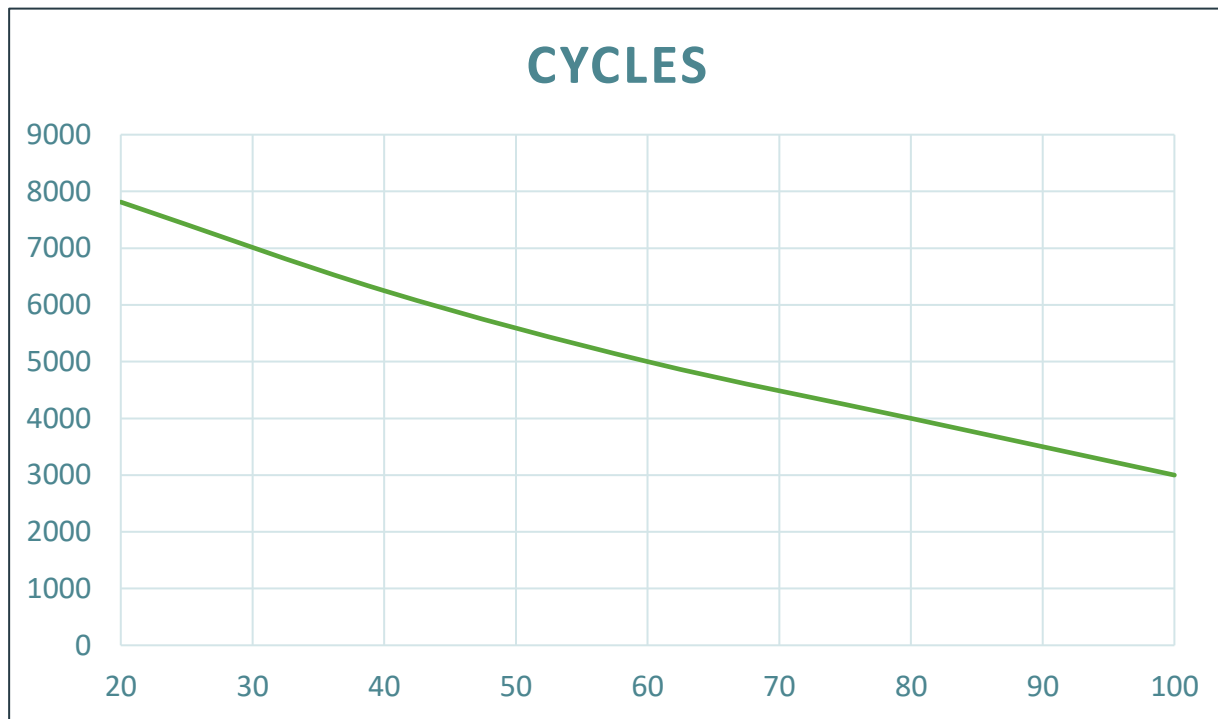
Cycle tests

- The test is done with max charge/discharge current, this to speed up the test result. A lower current, 0.2CC/0.5CD will enhance number of cycles.
- To only charge the battery to 80% will prolong cycle life.



100% DoD test

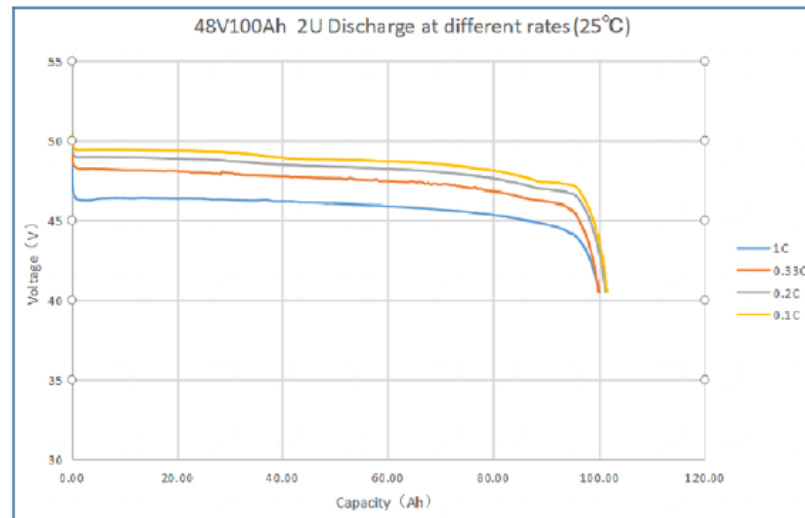
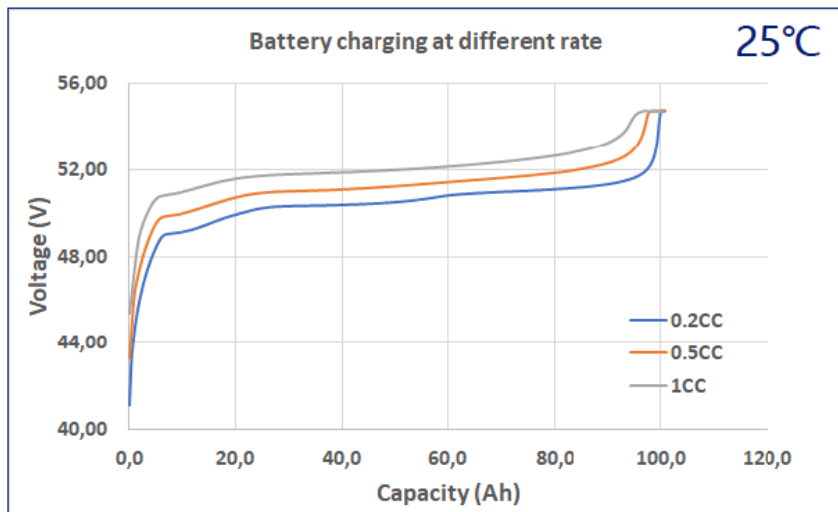
Cycle life vs DoD



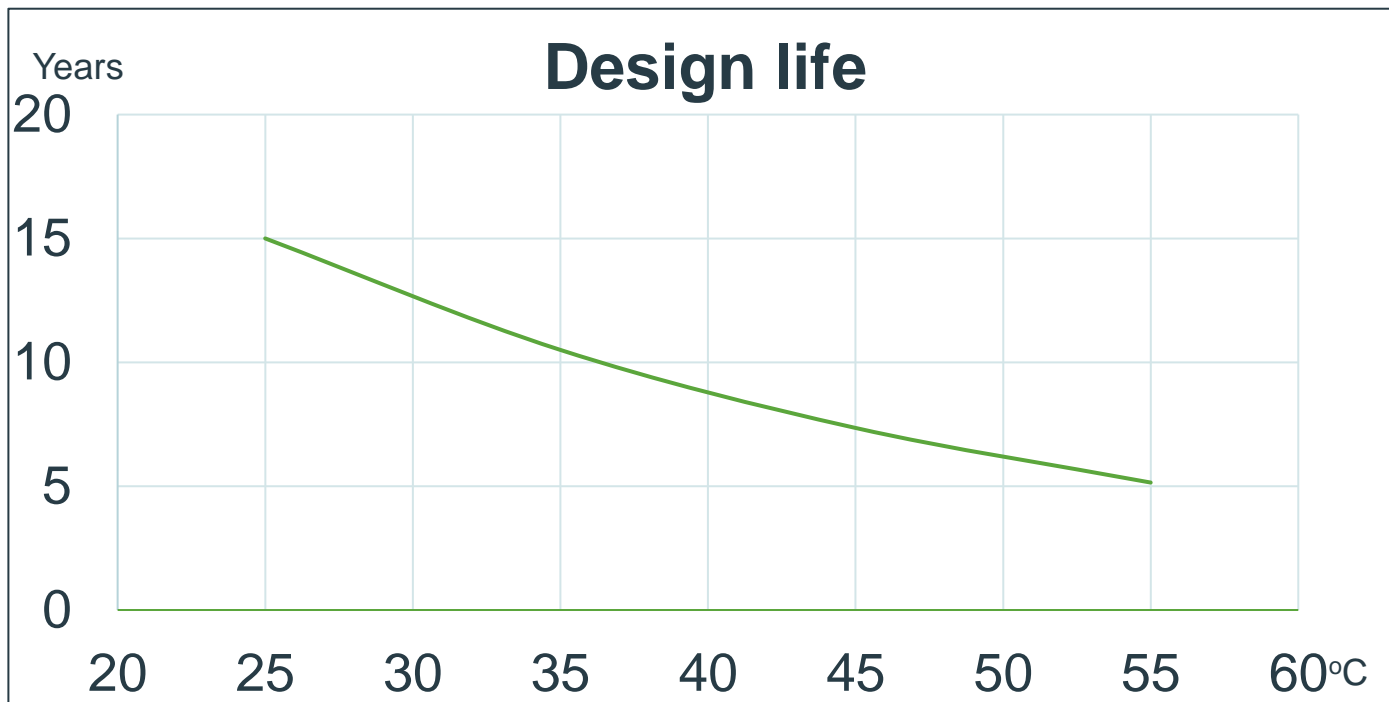
DoD	Cycles
20	7813
40	6250
60	5000
80	4000
100	3000

EoL 80% SoH
0.5C Charge current
1C Discharge current

Charge/discharge curves

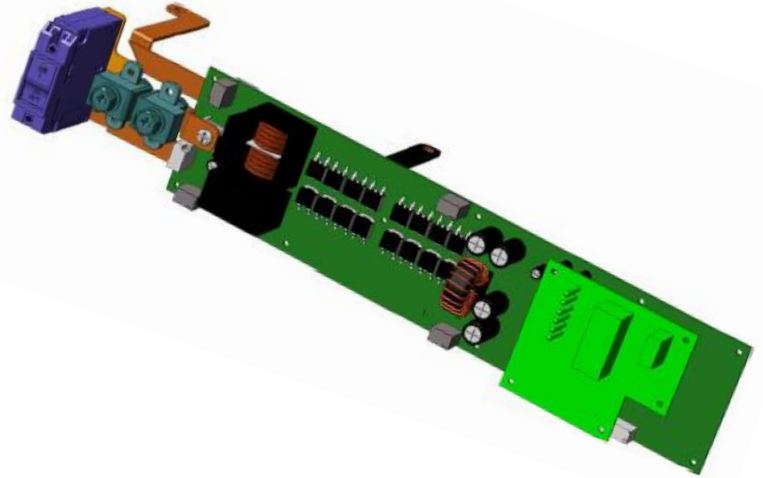


Battery aging due to temperature



BMS

- 125A CB
- Individual cell voltage and overall voltage detection, overcharge and over-discharge alarm and protection.
- Core high and low temperature alarm and protection functions, MOS high temperature alarm and protection functions, and environment high and low temperature alarm functions
- Short circuit protection function, reverse connection protection function
- SOC, SOH estimation function
- Tilt angle anti-theft function
- RS485 communication interface
- CAN automatic address assignment function
- Secondary protection function



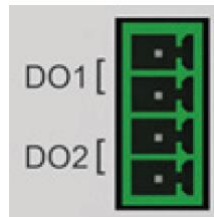
Communication

Modbus:

Description	Format	Unit
Module Voltage	Value/100	(540=54.5)V
Module Current	Value/10	(100=10)A
Module Temperature	Value/10	(240=24) ^o C
State of Health	Value/1	%
State of Charge	Value/1	Ah
Impedance	Value/1	mOhm
Time left	Value/1	Minutes
Ah Charged	Value *100	Ah
Ah Discharged	Value *100	Ah
No of Discharge cycle	Value/1	None
No of Charge cycles	Value/1	None
Alarms	1= Alarm 0=Normal	None
Warnings	1= Warning 0=Normal	None
Status	0=No 1=Yes	None

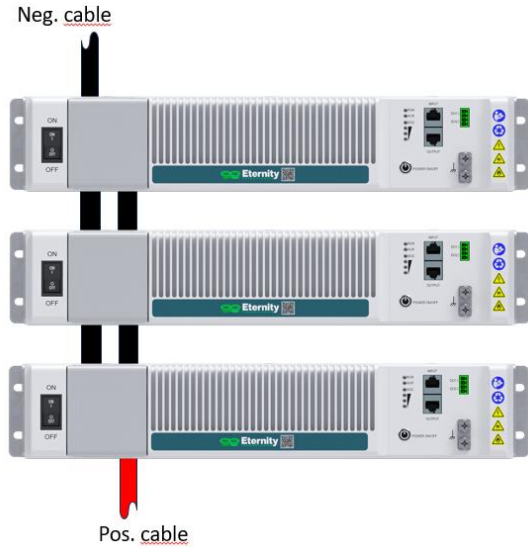


Dry Contacts:

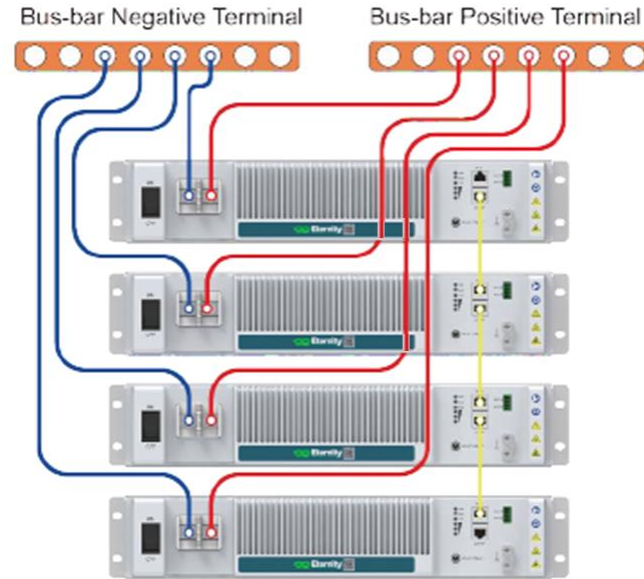


DO1	Open: Normal operation; Close: Alarm for abnormal discharge (End of discharge, over-current, over-temperature, short circuit)
DO2	Open: Normal operation; Close: HW faults, such as MOS, NTC, AFE, etc

Connection strategies

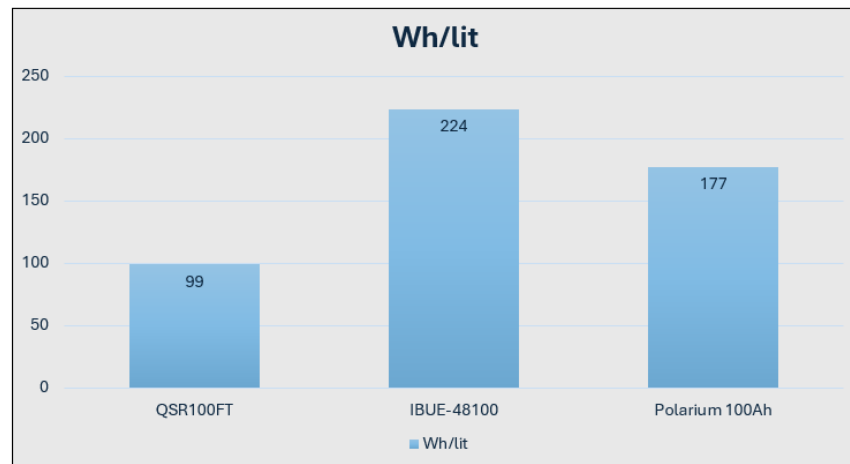
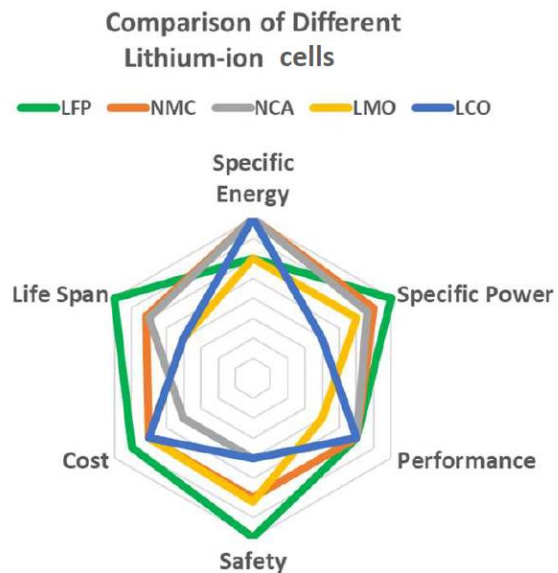


Busbar for low current applications (<200A)



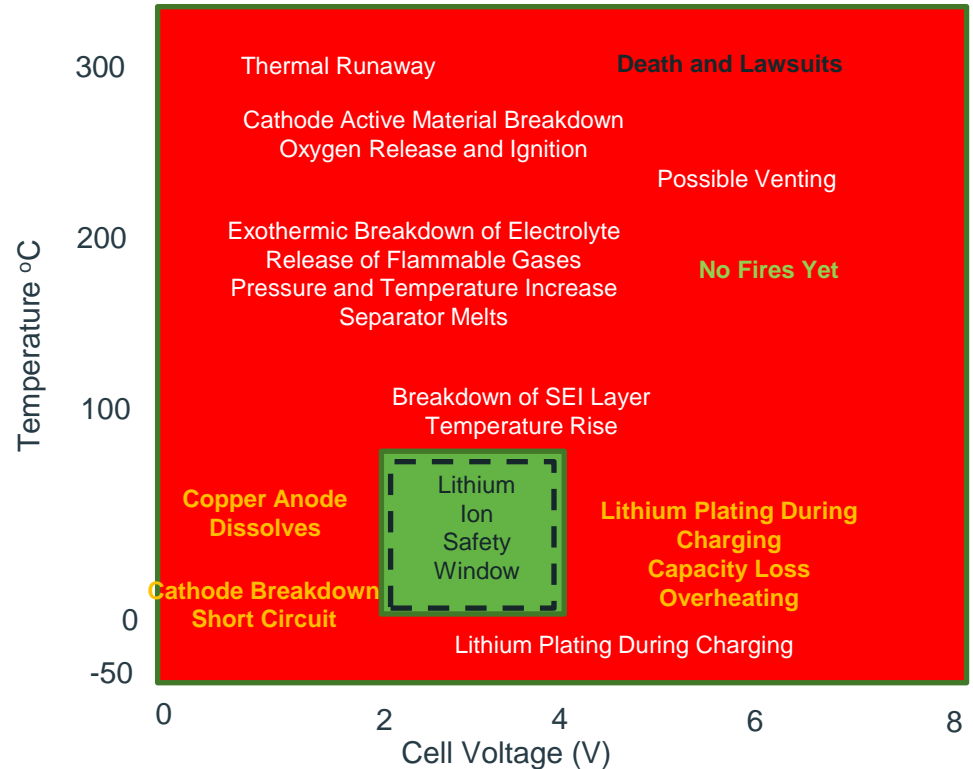
Common connection point and individual cables for high current applications

One of the best LFP Energy Density in the market



Lithium Safety

- All Lithium batteries rely on the BMS to protect against operation outside the safe parameters, mainly voltage and temperature.
- If the BMS fails, our battery has a second layer protection that disconnect the battery from the system.
- If the second layer protection fails, LFP is by design much less prone to go into thermal runaway and if so with much less intensity compare with NMC as LFP not generates any oxygen during the process.



Aging of Li-ion batteries

- The warmer, the more parasitic side reactions. Rule of thumb, half the life every 20°C rise of ambient temperature. Charging is not allowed above 45°C.
- The higher charge voltage, the faster the decay of capacity.
- High charge current the whole recharge will reduce cycle life.
- Charging in sub-zero temperature risks metal plating of Lithium, could create short circuit.
- Discharge below end voltage can dissolve copper from Anode, could cause short circuit.

Lithium Pros and Cons

- Thrive partial charged
- Excellent cycle life
- Long float life
- Will send alarm if faulty
- Can send SoC/SoH values Northbound
- Same Capacity independent on discharge rate
- The BMS will disconnect any discharge above 100A.
- Multiple of batteries need reduced current capability due to risk of uneven current sharing.
- Electronics in BMS is a source of failure.
- BMS must be protected against too high voltage surges.
- No charging in subzero temperature
- No charging above 45°C
- Need protection against moist, dust and salt mist.
- Return shipment of faulty batteries is problematic
- Recycling processes are unmaturing

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