



Marine & Offshore

Certificate number: 73860/A0 BV

File number: MPA1603213

Product code: 2899I

This certificate is not valid when presented without the full attached schedule composed of 7 sections

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TYPE APPROVAL CERTIFICATE

This certificate is issued to

PowerTech Systems
SAINT CYR L ECOLE - FRANCE

for the type of product

LITHIUM-ION BATTERY SYSTEM
PowerModule Slaves (48V/105Ah)

Requirements:

Bureau Veritas Rules for the Classification of Steel Ships.

IEC 62619:2022.

IEC 62620:2014

EC Code: 31

This certificate is issued to attest that Bureau Veritas Marine & Offshore did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.

This certificate will expire on: 11 Dec 2028

For Bureau Veritas Marine & Offshore,

At BV LYON, on 11 Dec 2023,

Yann Krempelwicz

This certificate was created electronically and is valid without signature



This certificate remains valid until the date stated above, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with and the product remains satisfactory in service. This certificate will not be valid if the applicant makes any changes or modifications to the approved product, which have not been notified to, and agreed in writing with Bureau Veritas Marine & Offshore. Should the specified regulations or standards be amended during the validity of this certificate, the product(s) is/are to be re-approved prior to it/they being placed on board vessels to which the amended regulations or standards apply. This certificate is issued within the scope of the General Conditions of Bureau Veritas Marine & Offshore available on the internet site www.veristar.com. Any Person not a party to the contract pursuant to which this document is delivered may not assert a claim against Bureau Veritas Marine & Offshore for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgement, fault or negligence committed by personnel of the Society or of its Agents in establishment or issuance of this document, and in connection with any activities for which it may provide.

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BV Mod. Ad.E 530 June 2017

This certificate consists of 3 page(s)

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION :

The **PowerModule Slave** is a battery module of 48V/105Ah with embedded communication. For small systems with up to 16 modules, which do not require cloud-based monitoring or precharge system, an external BMS is not required.

1.1 - Battery cell Specifications:

Product Name	Prismatic Aluminum-clad LiFePO4 Lithium Ion Battery
Model	LF105
Nominal capacity	105Ah
Nominal voltage	3.2V
AC Impedance resistance (1KHz)	≤ 0.5mΩ
Standard charge/discharge	0.5C/0.5C
Maximum current of charge/discharge	1C/1C

1.2 - Battery Module Specifications:

Technology	LFP - LiFePo4
Min/Nominal/Max voltage	48.0V/51.2V/58.4V
Capacity / Energy stored (at 1C, 25°C)	105Ah/5.376kWh
Weight (+ /- 3%)	43.5 Kg
Dimensions (l * w * h)	400 * 290 * 230 mm
Continuous discharge current(at 20°C)	125A (6.4kW)
Recommended charging voltage	57.0V
Maximum charging voltage	58.4V
Standard charging current	50A (2.56kW)
Fast charging current	100A (5.12kW)
Protection class	IP54

1.3 - BMS System:

PowerModule Slave internal BMS, **SW version: 5.x**

- Features: - Balancing of the 16 cells composing the PowerModule
- Monitoring of the pack and cell voltage
 - Real time monitoring of the delivered current
 - Precise calculation of the SoC (State of Charge) by precision shunt and Hall effect sensors
 - Measurement of the SoH (State of Health) by means of algorithms.
 - Monitoring of the temperature of the electronics and the cells
 - Security via power contactor
 - Digital communication via CAN-BUS with other system components

2. DOCUMENTS AND DRAWINGS :

- xxx Energy Co., Ltd Product Specification, No. xxxx-73103 Version F, dated 02-12-2019.
- Power Module Installation and user Manual V1.0, dated 16-09-2022.
- Power Module BMS Safety functions V1, dated 11-09-2023.
- Description Software and Algorithms of PowerModule, V1.0, dated 14-09-2023.
- Power Module Analyse de Risque V1, dated 01-06-2023.
- Power Module List of material V1, dated 11-09-2023.
- Power Module List of interface V1, dated 20-07-2023.
- Power Module Mechanical and electrical design drawings V1, dated 20-07-2023.
- Power Module Quality plan for software design, dated 01-03-2019.
- Power Module Plan de Test V2, dated 26-06-2023.

3. TEST REPORTS :**TÜV:**

- Test Report IEC 62619 No. 50296284 001, dated 29-10-2019.
- Test Report IEC 62619 No. CN21KD23 001, dated 20-11-2021.
- Test Report IEC 62620 No. CN23JTGS 001, dated 06-06-2023.

PowerTech:

- Rapport de test Fonctions de sécurité PowerModule pour BV Marine, witnessed by BV surveyor on 18-09-2023.
- Thermal Runaway test result, witnessed by BV surveyor on 18-09-2023.

EMITECH:

- EMC Test Report No. RCE-EMIESS23E100POW-01Av1, dated 10-08-2023.
- Degrees of protection test report IP54, No. RCL-EMIESS221690POW-1-A(00), dated 25-03-2022.
- Climatic Test report No. RCL-EMIESS23C984POW-01v00, dated 04-08-2023.
- Vibration Tests Report No. RME-EMIESS23C984POW-01Av00, dated 11-08-2023.

4. APPLICATION / LIMITATION :

- 4.1 - BV Rules for the Classification of Steel Ships.
- 4.2 - Approval also valid for ships to be granted for the notations: **AUT-UMS, AUT-CCS, AUT-PORT, AUT-IMS & BATTERY SYSTEM.**
- 4.3 - BUREAU VERITAS Environmental Category, **EC Code: 31**
- 4.4 - The equipment fulfils the EMC requirements for installation in General Power Distribution Zones.
- 4.5 - The installation shall comply with the Manufacturer's recommendation described in the above-referenced documentation.
- 4.6 - Risk Analysis document (referenced in 2) should inform project-specific battery room risk analysis.
- 4.7 - The Documentation according the Battery System required on BV NR467, Pt.F, Ch.14, Sec.1 Battery Sytem shall be submitted for approval for each Project.
- 4.8 - The battery system shall only be operated with a fire suppression system, for example a water mist system or a foam based system. The installation and arrangement shall be performed in accordance with Manufacturer's recommendation.
- 4.9 - Only Hardware and Firmware / Software successfully tested together in compliance with the rules as referred to in cover page, according to the declaration of the manufacturer are covered by this certificate.
- 4.10 - Any modification of the hardware, firmware or software having an impact on the product performance or functionality has to be validated with type testing.
- 4.11 - Equipment covered by this Type Approval certificate has been tested according to requirements of IACS UR E10 rev 8.

5. PRODUCTION SURVEY REQUIREMENTS :

- 5.1 - The PowerModule Slaves are to be supplied by **PowerTech Systems** in compliance with the type and the requirements described in this certificate.
- 5.2 - This type of product is within the category IBV of Bureau Veritas Rule Note NR320.
- 5.3 - BV product certificate is required.
- 5.4 - For information, **PowerTech Systems** has declared to Bureau Veritas the following production site(s):

PowerTech Systems
BAT 1
6 BOULEVARD GEORGES GUYNEMER
ZA CHARLES RENARD
78210 SAINT CYR L'ECOLE
FRANCE

6. MARKING OF PRODUCT :

- Maker's name or trade mark.
- Serial number of the units.
- Equipment type number or model identification under which it was type tested.
- Ⓢ or Ⓜ conformity marking, as relevant

7. OTHERS :

It is **PowerTech Systems**'s responsibility to inform shipbuilders or their sub-contractors of the proper methods of fitting, use and general maintenance of the approved equipment and the conditions of this approval.

*** END OF CERTIFICATE ***