pitchsafe

Lithium-ion (LFP) battery system for wind turbine pitch drives

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PITCHSAFE – SMART LITHIUM-ION BATTERY SYSTEM

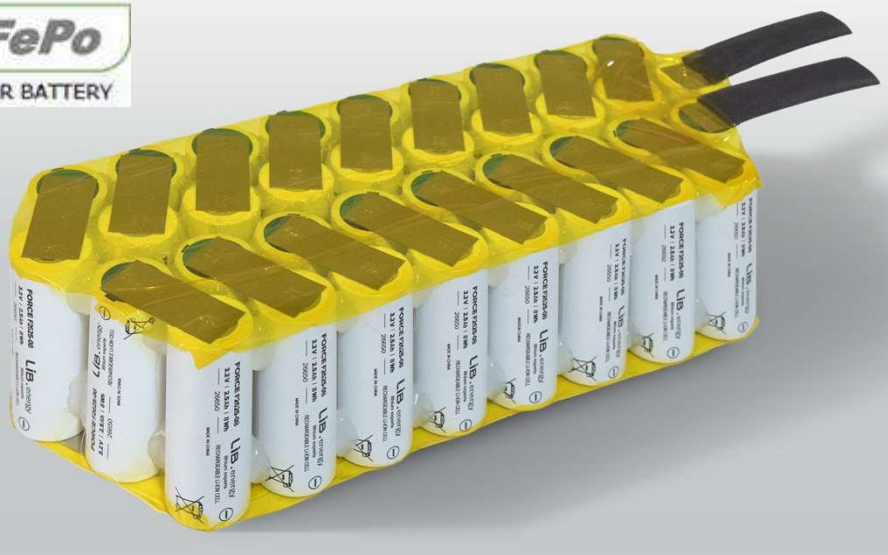
Based on lithium-ion (LFP) batteries, the pitchsafe li-ion battery system is used in pitch drives on megawatt wind turbines to securely position the rotor blades in an emergency situation.

The system is designed to withstand the harsh environmental conditions within the rotating hub of a wind turbine. Exceptional maintainability, durability and compact dimensions characterise the system.

Key features

- **OPTIMAL LEAD BATTERY RETROFIT SOLUTION**
  designed for easy integration into your existing solution
- **MODULAR SYSTEM DESIGN**
  distributed battery management system featuring a monitoring unit and battery pack with integrated balancer modules
- **40% VOLUME REDUCTION**
  in comparison to earlier back-up systems thanks to li-ion technology
- **RELIABLE MONITORING**
  of all voltages and conditions including SOC (state of charge) and SOH (state of health) calculations
- **SYSTEM COMMUNICATION**
  via fieldbus, PROFINET for example

LiFePo
MODULAR BATTERY



125 A
Peak discharge current

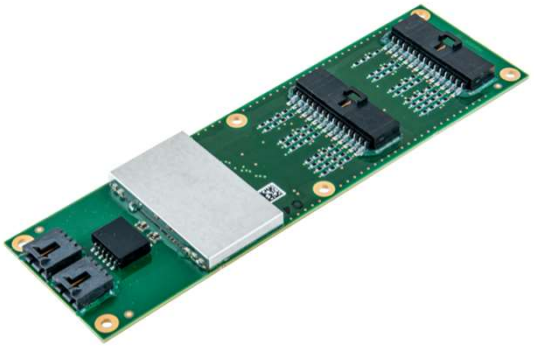
2.5 Ah
Pack capacity

230 V
Pack voltage

BATTERY PACK, CELLS AND BALANCER MODULES

Balancers

Balancer modules integrated within the battery pack ensure correct operation, voltage and temperature measurement and battery cell balance.



- isoSPI or isoCAN communication to the battery management unit (BMU) via daisy chain and to additional balancer modules
- Measurement of the voltages of all battery cells and temperatures
- Balancing for even electrical charge distribution and protection against critical states

Modular battery pack

Configuration	1P72S (4 low-voltage balancer modules in series)
Cell manufacturer	LIB.energy
Cell name	FORCE F2625-08
Cell type	26650
Cell chemistry	LFP
Weight per cell	70 g
Power per cell	8 Wh
Power per module	288 Wh
Capacity per cell	2500 mAh
Pack capacity	2.5 Ah
Pack voltage	230 V DC
Const. current (charge/discharge)	~ 2.5 A
Peak discharge current	~ 125 A for 2s
Peak charge current	~ 2.5 A
Protection rating	IP20 EN 60529
Communication	isoSPI or isoCAN
Balancing	Passive, nominal 80 mA
Internal resistance	ESR ≤ 0,5 Ω (@1kHz)
Volume	9 litres
Dimensions (LxWxH)	496mm x 216mm x 90mm
Weight	12.3 kg

BATTERY MONITORING UNIT

Battery monitoring unit

As the master, the battery monitoring unit (BMU) is a component of the battery system and simultaneously a PROFINET gateway.

In addition to monitoring and controlling the battery pack, the BMU provides system-relevant data to the PROFINET IO controller.

Key features

- isoSPI or isoCAN communication to the battery pack
- Monitoring of all battery parameters and calculation of:
  - Optimum charging currents
  - State of charge (SoC)
  - State of health (SoH)
  - Pack voltage
- Service features
  - Number of discharge cycles
  - Chronological age of the battery pack
  - Operating hours counter
  - Battery pack and BMU ID numbers
- Detailed warning messages
- Fault and critical state reporting

Specifications

Device function	PROFINET IO Device
Conformance class	B
Transfer rate	100Mbit/s
Update rate	16ms (RT, adjustable)
Version	PROFINET IO 2.35
Protocols	SNMP, LLDP
Supported MIBs	MIB2
Real time class	RT_CLASS_1
Network load class	II
Supply	24V DC +/- 20%
Interfaces	2x RJ-45 (fieldbus)
	1xD-SUB (isoSPI)

BENEFITS OF LI-ION BATTERY CELLS

Maintainability
Predictable servicing through calculation of SOH and SOC. Accurate health data eliminates the need for preventative cell exchange.

Environment
The chemical composition of lithium iron phosphate also presents as a natural mineral. It contains no toxic heavy metals such as lead, cadmium or a nickel-cobalt mix.

Charging times and performance
Higher charging currents enable shorter charging times in comparison to conventional systems. Cyclical charging routines are not required: meaning memory effect problems, reduced battery service life due to partial charging, have no bearing.

Safety
Lithium iron phosphate cells are more stable and also safer than standard lithium-ion or lithium polymer systems as there is no risk of combustion in the case of overheating or mechanical misuse.

Operating costs
Lithium iron phosphate cells are maintenance-free. No additional after-sales servicing and operational costs means reduced costs over the service life.

Installation
The minimal weight and compact size ensure easy handling during installation and servicing. This enables the implementation of ideal retrofitting solutions on the basis of li-ion technology.

Weight
Lithium iron phosphate cells have a considerably higher energy density, resulting in a significantly more lightweight and compact battery pack in comparison to lead equivalents. Integration and exchange is therefore considerably more straightforward.

Durability
Lithium iron phosphate cells last for around 3,000 cycles. Equating to almost 10-times the number of cycles attributed to lead batteries, the result is a significantly longer service life of between 5 and 7 years.

INTEGRATION

Hard-, Firm- and Softwareintegration

The pitchsafe lithium-ion battery system, developed in accordance with customary industry standards and norms, is integrated into the individual system environment in terms of both hardware and software:

- Adaption of the PROFINET IO device interface
- Adaption of the PROFINET IO controller interface via PROFINET IO supervisor
- Commissioning and testing of the PROFINET interface
- Development of visual HMI environments
- Customised matching of software and hardware
- Development of virtual modules and stacks

Hardware, components and devices are developed using a modern tool chain.

Mechanical integration

Services provided to our customers include mechanical configuration, specific load calculations, physical analyses, thermodynamic calculations and spatial integration.

Processor technology

The battery monitoring unit with integrated gateway is based on the Hilscher multi-protocol SoC netX90.
As a Hilscher technology partner we are in a position to integrate and process a variety of industrial Ethernet, fieldbus and IoT standard protocols. We achieve this with a high degree of flexibility for a variety of industrial device applications within the process and factory automation environment. To implement your PROFINET interfaces we use PHOENIX CONTACT and bachmann technology components.
We bring our requisite professional expertise to bear in the implementation of high-performance device interfaces as well as complex PROFINET controller interfaces and PROFINET profiles.

We also provide concept-specific support during the configuration and implementation of functionally reliable hardware and software applications.

BWTS GmbH
WIND TURBINE SERVICES

MAINTENANCE AND INSTALLATION SERVICE

Service partner

BWTS GmbH is a longstanding professional and reliable provider of wind turbine maintenance work, qualified inspection, PPA testing, overhaul and repair.

BWTS GmbH developed hand-in-hand with wind power in Germany and to date the company has carried out onshore and offshore work in more than 25 countries.

Services

Assignments worldwide from two countries with over 100 service technicians in four locations. Installation of retrofits for various wind turbine manufacturers in addition to:

- Hazard assessment
- Risk assessment
- Work instructions
- Operating instructions
- Disposal
- Transportation and logistics

Locations

Headquarters Rostock
Erlenweg 6
18198 Stäbelow, Germany

Branch office Nordhorn
Twentestrasse 4a
48527 Nordhorn, Germany

Branch office Hamburg
Beckedorfer Bogen 33
21218 Seevetal, Germany

BWTS France SAS |
Headquarters Amiens
4 rue des Indes Noires
80440 Boves, France

Service solutions

QUALIFIED INSPECTIONS
Access systems, chain hoists, cranes, ladders, PPE, fire extinguishers, rescue equipment ...

INSTALLATIONS
Conversions, reconstructions, component replacement, repowering ...

COMMISSIONING
Winches, safety gear, chain hoists, individual components or entire systems ...

SERVICING
Break-in, 6-monthly and annual maintenance, lubrication maintenance and full servicing ...

MAINTENANCE
Fault finding, repairs, oil changes, cleaning, disposal, drainage ...

TRANSFORMER MAINTENANCE
Servicing, maintenance, overhauls, fault diagnosis, repairs ...

PRESSURISED VESSEL TESTING
Testing of pressure systems requiring supervision in accordance with German industrial health and safety regulations (BetrSichV) ...

DISTRIBUTION AND DEVELOPMENT PARTNERS

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