Flex'ion® Li-ion battery system

For Mission Critical Applications

DATA CENTERS

OIL & GAS

UTILITY

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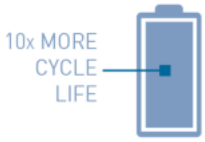
Flex'ion® main advantages

Flex'ion® battery solutions offer a wide range of energy and power combinations from 1.3 kWh to 3 MWh and 10 kW to 5 MW for mission critical applications

Main benefits versus VRLA lead-acid products

LIFE TIME

20 YEARS CALENDAR LIFE



INSTALLATION SPACE

3x MORE COMPACT

INSTALLATION WEIGHT

6x LIGHTER

MAINTENANCE-FREE

Flex'ion assets

A SCALABLE, HIGH POWER AND RELIABLE Li-iON BATTERY SOLUTION

Built with Saft's proven **Super Lithium Iron Phosphate (SLFP™) proprietary technology**, Flex'ion® offers **superior performance** whilst maintaining the highest levels of **safety, reliability and availability.**

Flex'ion® modular design provides **outstanding system flexibility** in terms of power, operating voltage and backup time answering your specific application's needs.

DESIGNED FOR MISSION CRITICAL APPLICATIONS

Flex'ion® battery systems are designed for **AC and DC UPS** (Uninterruptible Power Supply), **ancillary power backup and switchgear applications** in mission critical facilities, such as **data centers**, **telecom**, offshore / onshore **oil & gas** and **utility** markets.

Flex'ion advanced Li-ion battery solutions are fully **IEC, UL** and **UN certified** to address the most demanding market requirements.

ENGINEERED AND MANUFACTURED IN USA & EUROPE

Flex'ion battery systems are designed and manufactured at Saft's state of the art Li-ion sites in **North America** (Jacksonville, Florida) and **Europe** (Nersac, France and Raškovice, Czech Republic).

Saft lithium-ion technology benefits from more than **25 years** of worldwide industrial and field **experience** in standby, space, defense, aviation and energy storage.

This cutting-edge battery system delivers a reduced total cost of ownership (TCO), an industry-leading power and energy density, and an outstanding **97%** roundtrip* **efficiency** that reduces power consumption.

*Roundtrip : charge / discharge

It is available either as a **full system** including cabinets or as a **kit of sub-components** to be integrated with power electronic equipment.

Flex'ion® scalable architecture

Voltage, energy and power on-demand

Flex'ion® fully integrated SLFP™ battery solution comprises modules, BMM (Battery Management Module), MBMM (Master Battery Management Module) for multi-string paralleling, Intelli-Connect supervision system and cabinet.

Its modular design allows serial and serial/parallel connection to reach different energy and power requirements, answering your specific application's needs.

- Serial connection from **87 V to 958 V**
- **BMM** (Battery Management Module) included for string management and interfacing
- Multi-string paralleling up to 18 strings through **MBMM** (Master Battery Management Module) to achieve :
  - high power up to 5 MW
  - high energy up to 3 MWh
- **Intelli-Connect monitoring system**
  - Facilitates power management and allows use with conventional constant potential (CP) or smart chargers
  - If the mains power fails and battery system charging is stopped, it will still be available for discharge.
- **Plug and play, Flex'ion battery systems operate perfectly with all brands and types of UPS**

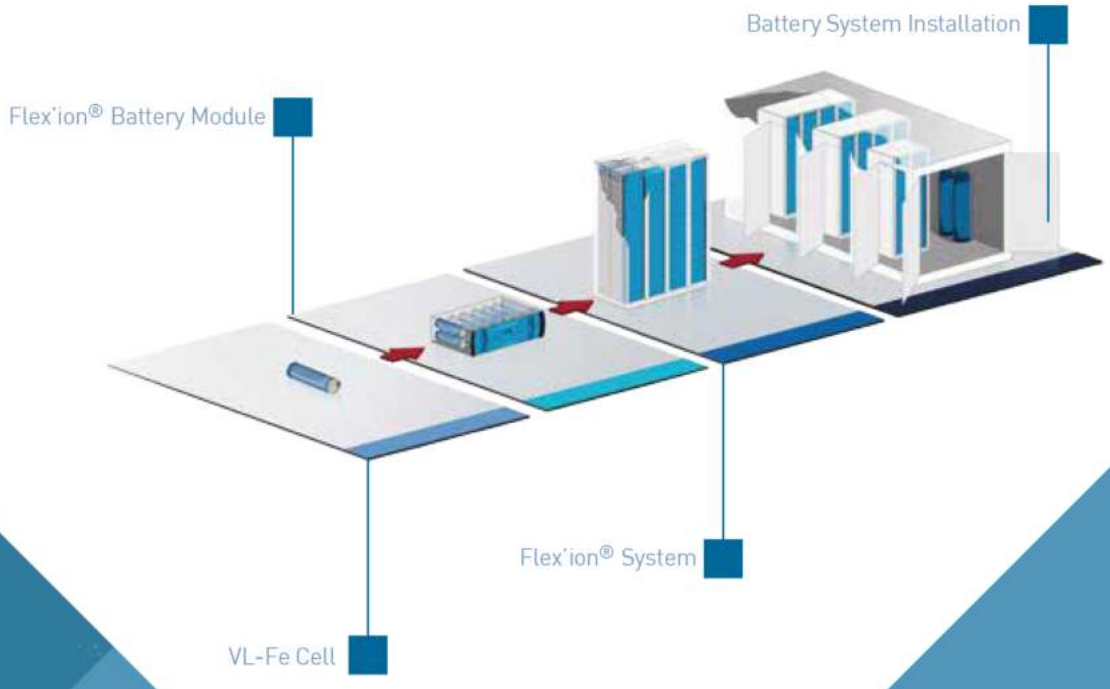
Energy to High power modules
Flex'ion® SLFP™ compact solution is based on 3 different modules:

- **23 M Fe, 46 M Fe** (Energy / Medium power)
- **46 P Fe** (High power)

The **patented Super Lithium Iron Phosphate** (SLFP™) chemistry **invented by Saft R&D** has a flat discharge curve, which is a natural fit for UPS systems that supply constant power.

Its 3.7C (23 volt & 46 volt M Fe) and 11C (46 volt P Fe) power capability enables **highly dynamic charge and discharge.**

Saft value chain : from cell, to module and system



Flex'ion® module range
Technical data

An advanced Battery Management System

The battery management system includes a Master Battery Management Module (MBMM), Battery Management Modules (BMM) and an Intelli-Connect proprietary monitoring system providing the following functions:

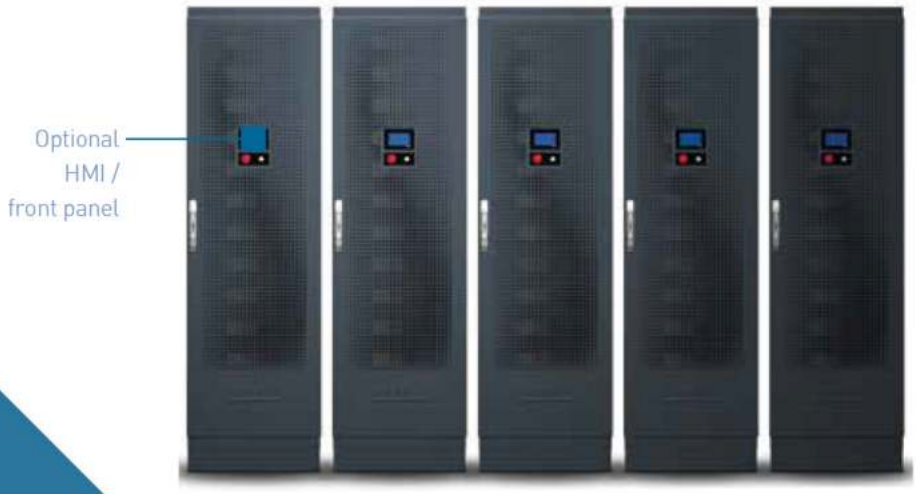
- **Monitoring and control of voltage, current and temperature** at cell level
- **State of Charge** (SOC) **balancing** between cells, modules and strings
- Real time calculation of:
  - Charge and discharge current limits
  - SOC using temperature, aging, voltage and current
- Programmable logic controller (PLC) with **pre-loaded protocols**: CANopen, Modbus (RS485 or TCP/IP), Ethernet (IEEE 802.3) and OPC communication
- Indication of:
  - **State of Health** (SOH) of the system integrating calendar aging and cycling
  - **State of Charge** (SOC) of the system
- **Alarm and fault management**

A scalable 19" rack cabinet (optional)

The battery modules fit standard 19" racks and are mounted in Saft designed cabinets, ensuring reduced floor space in battery rooms. They are available in both seismic and non-seismic versions.

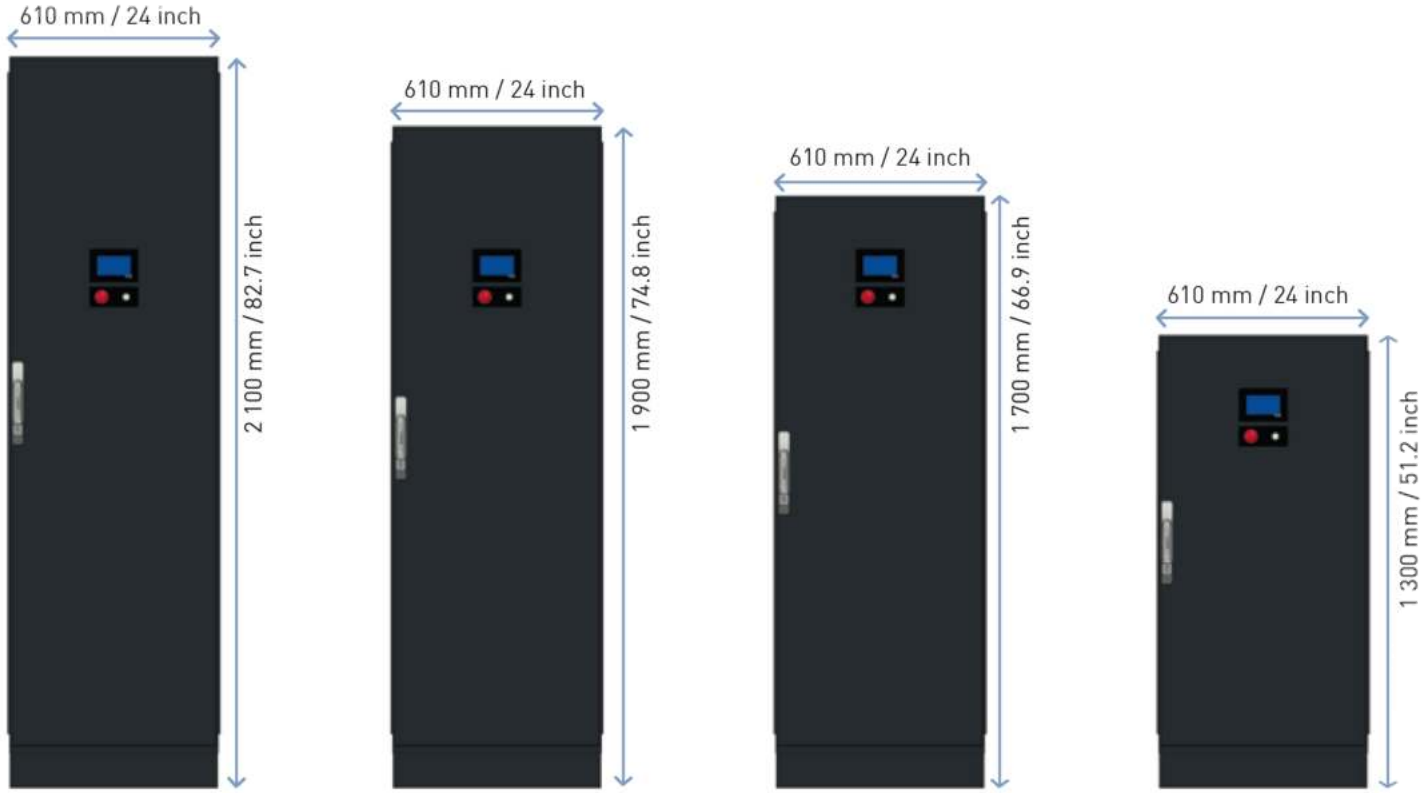
Saft's Flex'ion® cutting-edge design includes an intuitive **human-machine-interface** (HMI) and **front panel battery** condition visual indication.

They are optional depending on your specific needs.



Flex'ion® product range
Technical data

4 sizes of cabinet answering your specific needs



COMPLIANCE TO STANDARDS	CE MARKING	2011/65/UE 2014/34/UE 2014/35/UE EN62477-1 2014/30/UE EN61000-6-X
	UL MARKING	UL1973 UL1642 UL1998 UL991
	ENVIRONMENTAL	UL1778 IEC62093:2005 IEC62262 IEC60529 IEC60068-2-1 IEC61587-2 IEEE 693 IEC60068-2-2 IEC60068-2-6 IEC60068-2-11 IEC60068-2-14 IEC60068-2-21 IBC IEC60068-2-27 IEC60068-2-30 IEC60068-2-78 IEC60721-3-12 IEC61587-1 CBC 2014
	SAFETY	IEC61508 IEC62619 FCC IFC 2112, §608 NFPA 70
	PERFORMANCE	IEC62620
	TRANSPORTATION	UN 38.3
MECHANICAL & ELECTRICAL INTERFACE	Horizontal installation	
	Includes 3U rack-mount brackets for 'KIT' format (excludes cabinet)	
	Power connectors on the front panel for ease of access	
	Supplied as a system (including cabinets) or a kit (mechanical design & ventilation in line with Saft recommendations)	
MECHANICAL & ELECTRICAL SAFETY	Safety driven design for cells, modules and systems guarantees safe behaviour in case of abuse usage or component failure	
	Implementation of redundant safety features at: - Cell level (e.g. shutdown effect separator, mechanical vent) - Module level (e.g. electronic boards, voltage and temperature monitoring, balancing) - System level (e.g. electronic boards, power switch & current sensor)	

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Flex'ion® product range
Technical data

		MEDIUM POWER		HIGH POWER
		FLEX'ION 23 M Fe 23 VDC - 9.0 kW	FLEX'ION 46 M Fe 46 VDC - 9.0 kW	FLEX'ION 46 P Fe 46 VDC - 9.0 kW
FUNCTIONAL CHARACTERISTICS	Proprietary cell chemistry	Super Lithium Iron Phosphate		
	Cell type	VL41 M Fe		VL30 P Fe
FEATURES	Adapted for discharge time of	>= 5min		1s to 15min
	Optimized for discharge time of	>= 8min		
	Power capability : discharge :	3.7 C		11 C
	charge :	1 C		2 C
GENERAL CHARACTERISTICS	Nominal voltage (V)	23	46	46
	Capacity (C/5 AH)	78	39	28
	Rated energy (C/5 kWh)	1.8		1.29
	Volumetric power density (W/L)	370		745
	Gravimetric power density (W/KG)	341		686
MECHANICAL CHARACTERISTICS	Width (MM/INCH)	445 / 17.5		
	Height (MM/INCH)	131 / 5.2		
	Depth (MM/INCH)	292 / 11.5		
	Weight (KG)	18.5		
ELECTRICAL CHARACTERISTICS AT +20°C (+68°F)	Voltage range (V)	17.5 to 26.6	35.0 to 53.2	
	Maximum continuous discharge current (A)	300	150	300
	Peak discharge current in 10 sec (A)	300	300	450
	Maximum continuous recharge current (A)	80	40	120
	Recharge time (H)	1.25		
	Module consumption (active mode)	5 V at 0.5 W		
	Insulation resistance (1000 VDC)	>100 MΩ		
	Dielectric	3 KV RMS		
MAXIMUM POWER (kW)	10 sec			16.8
	1 min			12.4
	5 min			12.0
	10 min			7.6
	15 min	4.3	6.3	5.3
	30 min	3.1	3.6	
	45 min	2.1	2.7	-
	1 h	1.6	1.8	
OPERATING CONDITIONS	Operating temperature	-20°C/+60°C (-4°F to +140°F)		
	Cycle efficiency	89% to 99%		
	Self-discharge	<3% per month		
	Calendar lifetime at +20°C (+68°F)	>20 years		
	Cooling	Natural convection		
	Maximum relative humidity	95% (non condensing)		
STORAGE CONDITIONS	Storage temperature	-30°C/+70°C (-22°F to +158°F)		
	Storage duration (80% SOC - 40°C)	10 months		

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