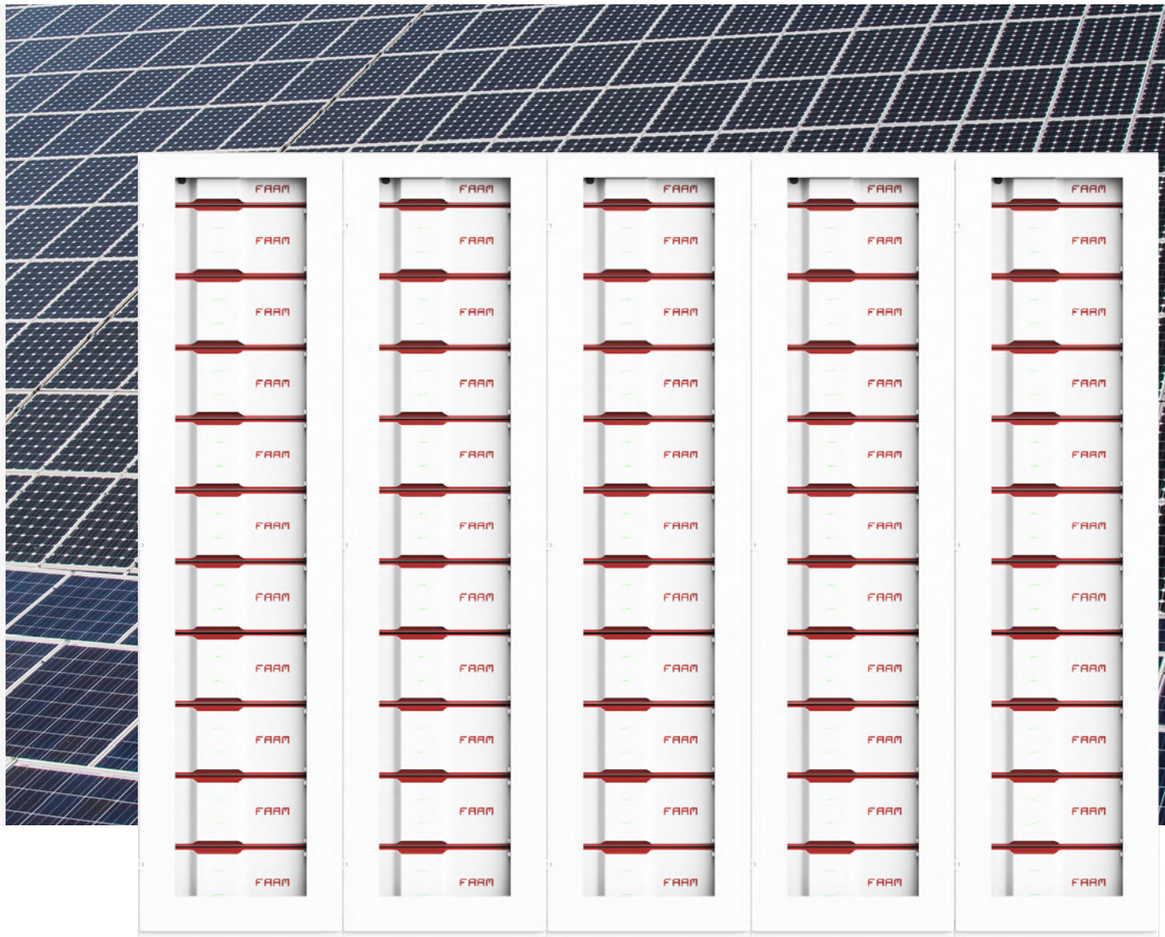
FAAM
Energy Saving Battery

Supply your energy saving with us

We are standing by to answer all your questions

info@faam.com
www.faam.com



ENERGY STORAGE SYSTEM

Advanced Lithium Technology

FAAM
SERI industrial GROUP

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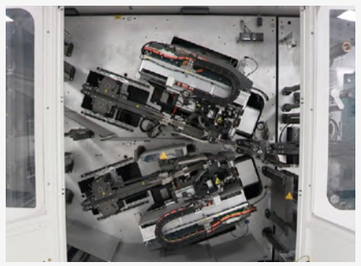
FAAM IS OWNED BY **SERI INDUSTRIAL GROUP** - WWW.SERI-INDUSTRIAL.COM

QUALITY SYSTEM CERTIFICATION DNV ISO 9001
ENVIRONMENTAL SYSTEM CERTIFICATION DNV ISO 14001

www.faam.com

OWNED EU MADE IN ITALY CELL PRODUCTION

LiStorage products are moved by our LC01 Li-ion cell based on LiFePO4. The characteristics of the cell guarantee high efficiency, safety and quality. Our innovative cell design increases mechanical and thermal stability.



FIRST ITALIAN ESS

The plant, in operation since 2014, has brought innovation by integrating the energy storage from renewable sources to the electricity grid. Thus providing a strong energy efficiency solution, that is able to storage energy according to the customers needs.

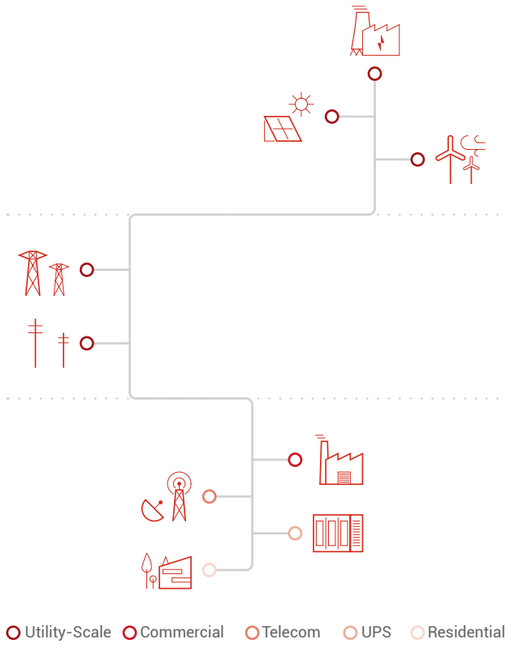
Why Faam Ess

With the **FAAM Energy Storage System** you can improve the efficiency of the grid system, thanks to peak shaving and frequency regulation features.

Moreover, our System allows to increase the independence from traditional energy suppliers, storing energy from renewable sources, such as photovoltaic or wind mills, that are characterized by cyclicality and limited predictability.

- **High number of cycles** (> 4000 cycles)
- **Energy saving** (efficiency > 98%)
- **High energy density and power**
- **Zero emissions**

Ess Categories



Characteristics

AC/DC

We provide DC solution using our products and AC Integration integrally customizable by the customer.

Peak Shaving

Discharge at peak demand to reduce expansive demand charges.

Renewable Integration

Smooth out the intermittency of renewables by storing and dispatching when needed.

Safety

Hight safety LiFePO, fire fighting system, AC/DC protection, Intrusion control and more.

Micro-grid

Use our ESS not only in grid systems but also for charge and discharge in small grid.

Remote control

Gather and control system data worldwhide trought remote control.

Ancilliary services

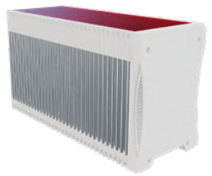
Provide service to the grid in response to signals sent or when a black-out happen.

Modularity

Our systems is modular, you can expand or replace one ore more module without problem.

+ Cell LC01

Chemistry	LiFePO4
Nominal Capacity	50 Ah
Nominal Energy	160 Wh
Nominal Voltage	3.2 V DC
Dimension (T x W x L)	12 x 194 x 218 mm
Weight	0.95 kg



+ Kombi Module for LiSTORAGE

Cells Type	LC01
Nominal Capacity	100 and 200 Ah *
Nominal Energy	5.2 kWh *
Nominal Voltage	51.2 and 25.6 V DC *
Dimension (L x W x H)	478.75 x 198 x 274 mm*
Weight	~ 35 kg*

+ LiSTORAGE 10.2

Module Type	2x Kombi Module
Nominal Capacity	100 and 200 Ah *
Nominal Energy	up to 10.2 kWh *
Nominal Voltage	102.4 and 51.2 V DC *
Dimension (L x W x H)	540 x 707 x 202 mm*
Weight	~ 90 kg*

+ LiRACK LiR10

Rack Type	LiR10
Nominal Capacity	from 100 up to 2000 Ah *
Nominal Energy	up to 102,4 kWh *
Nominal Voltage	1024 and 512 V DC
Dimension (L x W x H)	600 x 800 x 2400 m
Weight	~ 1000 kg*

+ LiBESS LiB20 / LiB40

DC Technical Characteristics

Cabinet Type	LiRack LiC40
Nominal Energy	up to 4,3 MWh *
Nominal Voltage	512 and 1024 V DC
Dimension	20 up to 40 ft *

* Other configuration are available upon request

FAAM LC01 CELL

The First Italian Lithium Cell

LC01 / 50Ah		
Battery Chemistery		LFP
Nominal Capacity	Ah	50
Capacity Usable (DoD 80%)	Ah	40
Nominal Energy	kWh	160
Energy Usable (DoD 80%)	kWh	128
Nominal Voltage	V DC	3,2
Minimum Voltage (Cut-off)	V	2,5
Maximum Voltage	V	3,65
Nominal Current in Discharge	A	50
Maximum Continuous Current in Discharge (25°C)	A	100
Peak Current in Discharge (10s)	A	150
Nominal Current in Charge	A	12,5
Maximum Continuous Current in Charge (25°C)	A	50
Nominal Power in Discharge	W	160
Maximum Continuous Power in Discharge (25°C)	W	320
Peak Power in Discharge (10s)	W	480
Nominal Power in Charge	W	40
Maximum Continuous Power in Charge (25°C)	W	160
AC IR	mΩ max	2,0
AC IR	mΩ max	3,0
Efficency (25°C)	%	98
Estimated Life	> year	10
Estimated Life in Cycles (25°C, DoD 80%)	>	4000
Functioning Temperature in Discharge	°C	-20 / +55
Functioning Temperature in charge	°C	0 / +45
Optimal Functioning Temperature	°C	23±3
Storage Temperature	°C	23±3
Self Discharge	%month	2
Operating Condition for Humidity	R.H.	0÷60
Thickness	mm	12.65 ±
Width	mm	194.1 ± 1
Length	mm	219.5 ± 1
Weight	Kg	0.95
Energy density - Volumetric	Wh/l	297
Energy density - Gravimetric	Wh/Kg	167

INNOVATIVE SOLUTIONS FOR BEST PERFORMANCE

Kombi Module Series

Kombi series products represents the most innovative solution in energy storage for all uses. The **long life**, the **charging speed**, the **absence of maintenance**, make the **Kombi** modules the perfect solution where performance, durability, safety and energy efficiency must not compromise.

For **ESS** the modules use are two type:

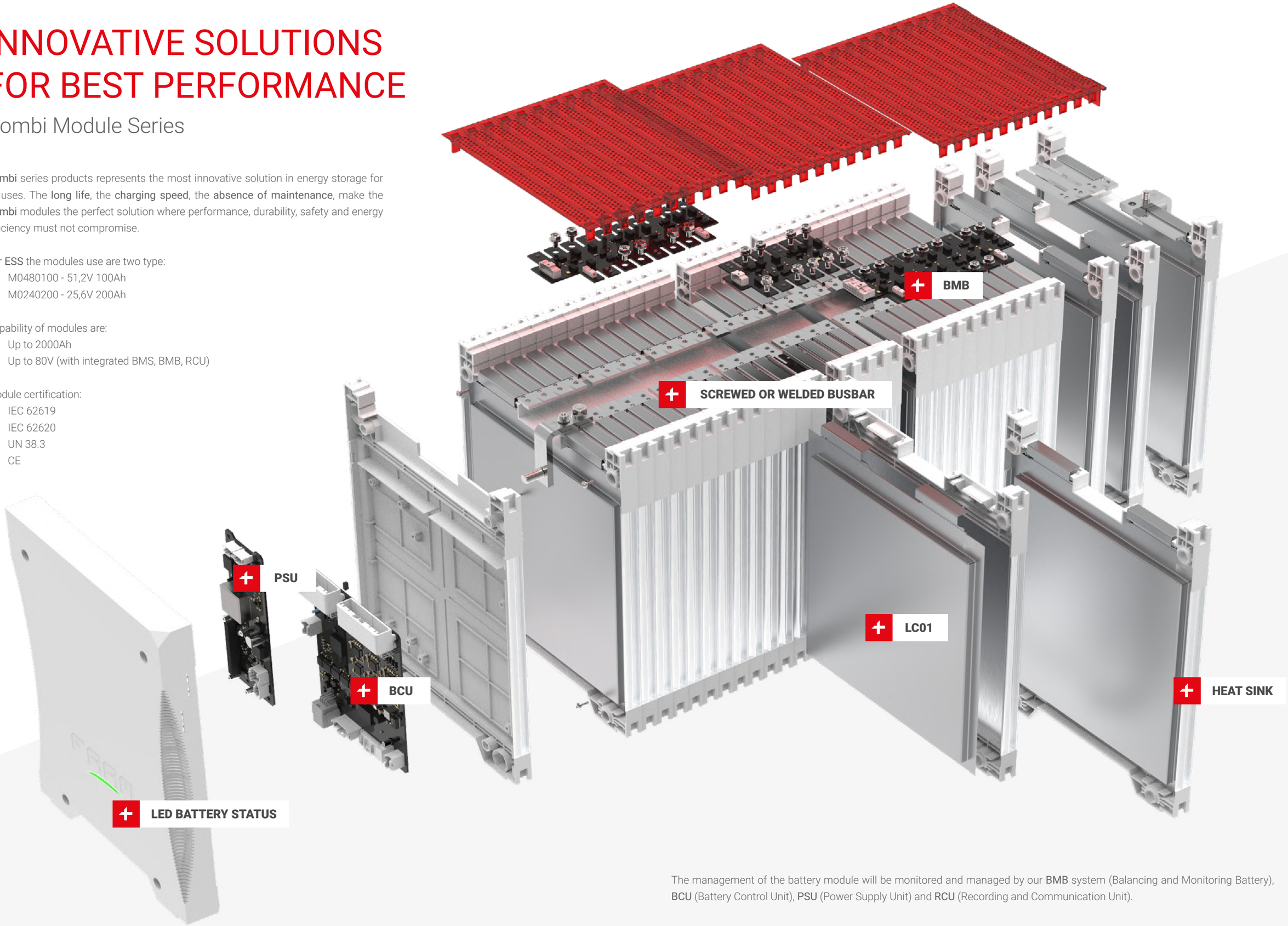
- M0480100 - 51,2V 100Ah
- M0240200 - 25,6V 200Ah

Capability of modules are:

- Up to 2000Ah
- Up to 80V (with integrated BMS, BMB, RCU)

Module certification:

- IEC 62619
- IEC 62620
- UN 38.3
- CE



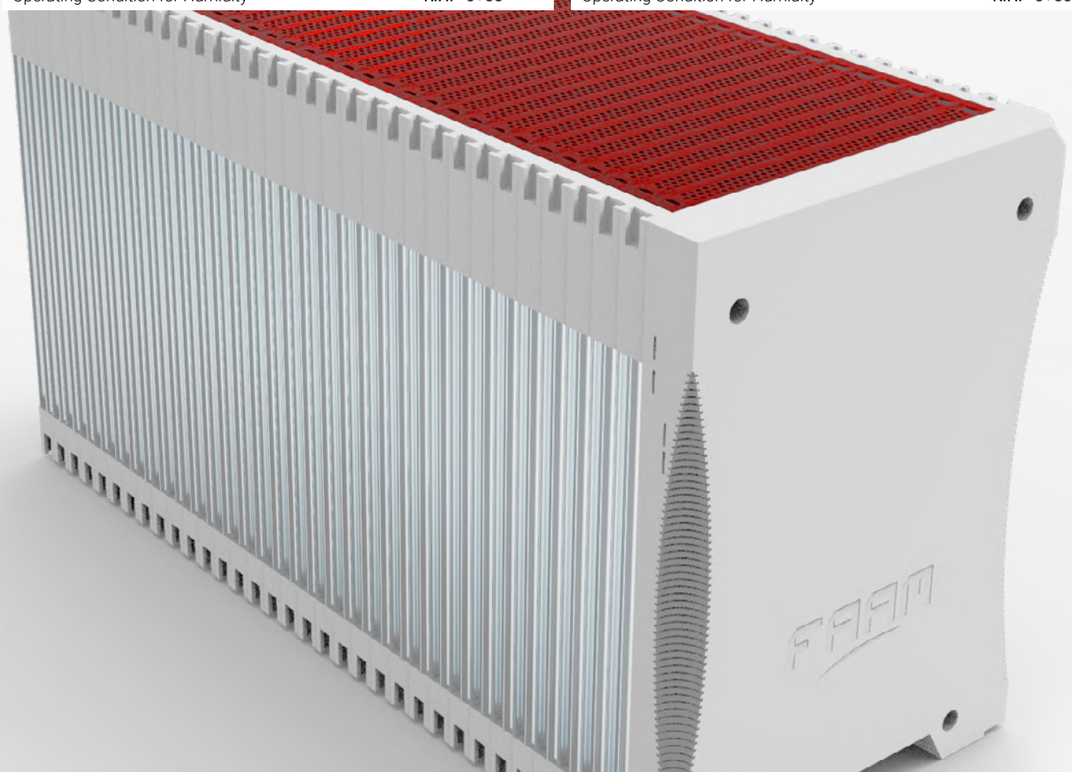
The management of the battery module will be monitored and managed by our **BMB** system (Balancing and Monitoring Battery), **BCU** (Battery Control Unit), **PSU** (Power Supply Unit) and **RCU** (Recording and Communication Unit).

KOMBI MODULE

Advanced Lithium Technology

LiStorage 102,4V / 100Ah		
Battery Chemistery		LFP
Nominal Capacity	Ah	100
Capacity Usable (DoD 80%)	Ah	80
Nominal Energy	kWh	10,24
Energy Usable (DoD 80%)	kWh	8,19
Nominal Voltage	V DC	102,4
Minimum Voltage (Cut-off)	V	80
Maximum Voltage	V	115,2
Nominal Current in Discharge	up to A	100
Maximum Continuous Current in Discharge (25°C)	up to A	200
Peak Current in Discharge (10s)	up to A	300
Nominal Current in Charge	up to A	50
Maximum Continuous Current in Charge (25°C)	up to A	100
Nominal Power in Discharge	kW	10,24
Maximum Continuous Power in Discharge (25°C)	up to kW	20,48
Peak Power in Discharge (10s)	kW	30,72
Nominal Power in Charge	kW	5,12
Maximum Continuous Power in Charge (25°C)	kW	10,24
Efficency (25°C)	%	98
Estimated Life	> year	10
Estimated Life in Cycles (25°C, DoD 80%)	>	4000
Functioning Temperature in Discharge	°C	-20+55
Functioning Temperature in charge	°C	0+45
Optimal Functioning Temperature	°C	23±3
Storage Temperature	°C	23±3
Self Discharge	%month	2
Operating Condition for Humidity	R.H.	0÷60

LiStorage 51,2V / 200Ah		
Battery Chemistery		LFP
Nominal Capacity	Ah	200
Capacity Usable (DoD 80%)	Ah	160
Nominal Energy	kWh	10,24
Energy Usable (DoD 80%)	kWh	8,19
Nominal Voltage	V DC	51,2
Minimum Voltage (Cut-off)	V	40
Maximum Voltage	V	57,6
Nominal Current in Discharge	up to A	200
Maximum Continuous Current in Discharge (25°C)	up to A	400
Peak Current in Discharge (10s)	up to A	600
Nominal Current in Charge	up to A	100
Maximum Continuous Current in Charge (25°C)	up to A	200
Nominal Power in Discharge	kW	10,24
Maximum Continuous Power in Discharge (25°C)	up to kW	20,48
Peak Power in Discharge (10s)	kW	30,72
Nominal Power in Charge	kW	5,12
Maximum Continuous Power in Charge (25°C)	kW	10,24
Efficency (25°C)	%	98
Estimated Life	> year	10
Estimated Life in Cycles (25°C, DoD 80%)	>	4000
Functioning Temperature in Discharge	°C	-20+55
Functioning Temperature in charge	°C	0+45
Optimal Functioning Temperature	°C	23±3
Storage Temperature	°C	23±3
Self Discharge	%month	2
Operating Condition for Humidity	R.H.	0÷60



LiSTORAGE 10.2

Unit Rack 19”

The rack unit houses two kombi modules. The design guarantees maximum safety and reliability. Ensuring the efficiency and life cycle of the battery. You can configure the rack in two versions for power solution or for energy solution, other configurations for voltage or capacity (51,2Vdc – 200Ah) or (102,4Vdc – 100Ah).

LiStorage 10.2 P – HIGH POWER:

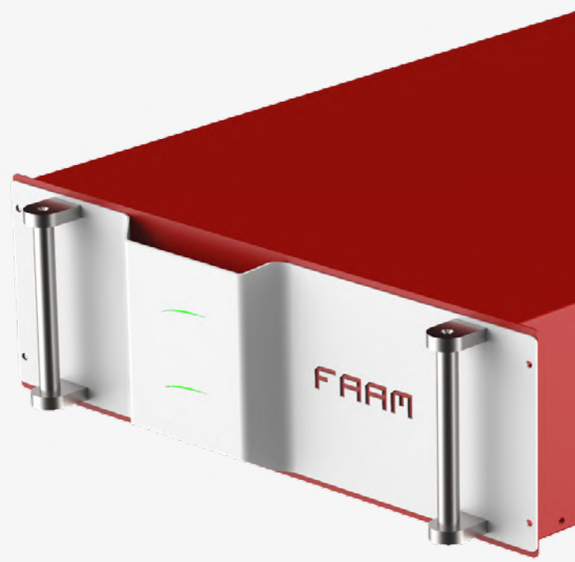
- Max Continuos Current in Discharge 2C
- Nominal Continuos Current in Discharge 1C
- Max Continuos Current in Charge 1C
- Nominal Continuos Current in Charge 0.5C

LiStorage 10.2 E – HIGH ENERGY:

- Max Continuos Current in Discharge 1C
- Nominal Continuos Current in Discharge 0.5C
- Max Continuos Current in Charge 0,5C
- Nominal Continuos Current in Charge 0.25C

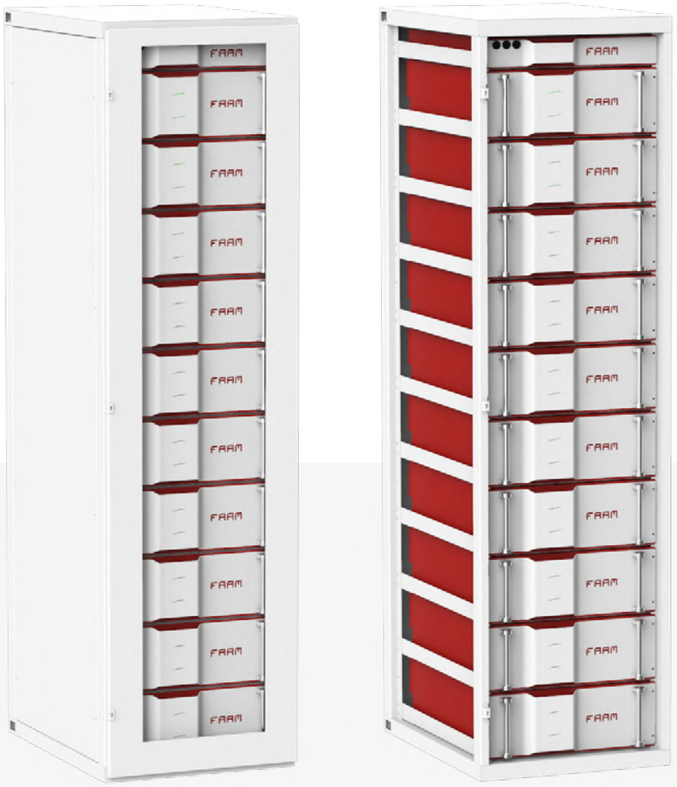
Module certification:

- IEC 62619
- IEC 62620
- UN 38.3
- CE



LiRACK

Cabinet Standard Rack 19”



LiR houses our racks **LiStorage 10.2**., thanks to an evolved system of plug & play connections.

With **LiR** you’ll have the flexibility to configure your own system as desired.

The maximum slots available for **LiR** are 10. Smaller sizes allow you to storage fewer racks and the space inside ensures that a control module for the entire string is also housed.

You can configure each **LiR10** up to a maximum of 10S or 10P. The string is controlled through the **FAAM** head-module and can be set and monitored in real time through an **HMI** installed on the front cabinet, or even remotely whenever and wherever you prefer.

The **ESS** system is designed: in POWER configurations to reach a maximum current of 40 0A at a nominal working voltage up to 1024VDC.

In the parallel configuration each **LiStorage 10.2** is independent with its own slave **BMS**, which controls the opening of a contactor, protected by a fuse. This makes the system safe and easy to be armed and maintained.

The Head-module guarantees the necessary protections in the series configuration, inside two contactors and fuse, which **LiStorage 10.2** are in any case protected by a fuse sized for the working voltage.

FROM THE RACK TO THE TURNKEY SOLUTIONS

ENERGY **POWER**

LiR-E
Up to 1024V DC / Up to 2000Ah (1C)

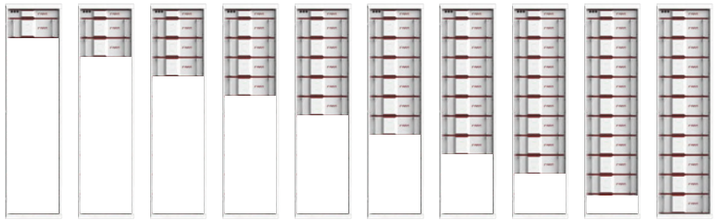
LiR-P
Up to 1024V DC / Up to 2000Ah (2C)

LiStorage 10.2 E-100V	LiStorage 10.2 E-48V	LiStorage 10.2 P-100V	LiStorage 10.2 P-48V

FOR ALL APPLICATION

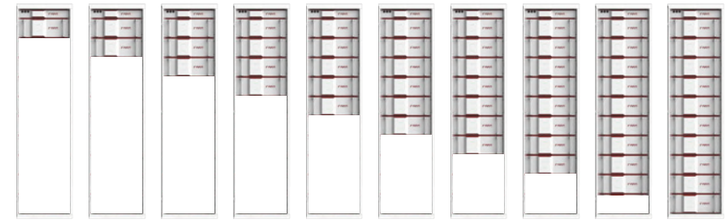
RE/Power Integration	Grid Support	Commercial & Industrial
Mini Grids	Off-Grid Industrial	Re-Charge

+ LiR-E serial configuration with LiStorage 10.2 E-100V



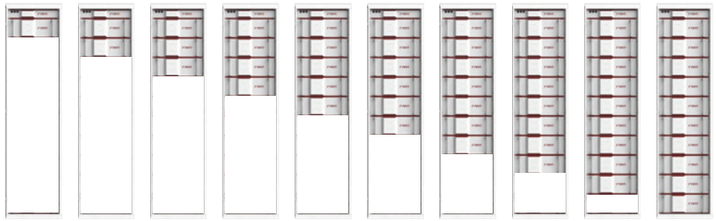
Nominal Capacity (Ah)	100	100	100	100	100	100	100	100	100	100
Nominal Energy (kWh)	10,24	20,48	30,72	40,96	51,2	61,44	71,68	81,92	92,16	102,4
Energy Usable (DoD 80%) (kWh)	8,192	16,384	24,576	32,768	40,96	49,152	57,344	65,536	73,728	81,92
Nominal Voltage (V)	102,4	204,8	307,2	409,6	512	614,4	716,8	819,2	921,6	1024
Minimum Voltage (Cut-off) (V)	80	160	240	320	400	480	560	640	720	800
Maximum Voltage (V)	115,2	230,4	345,6	460,8	576	691,2	806,4	921,6	1036,8	1152
Nominal Discharge	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C
Maximum Current in Discharge	1C	1C	1C	1C	1C	1C	1C	1C	1C	1C
Peak in Discharge (10s)	2C	2C	2C	2C	2C	2C	2C	2C	2C	2C
Nominal in Charge	0,25C	0,25	0,25C	0,25C	0,25C	0,25C	0,25C	0,25C	0,25C	0,25C
Maximum Current in Charge (25°C)	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C
Peak in Charge (10s)	1C	1C	1C	1C	1C	1C	1C	1C	1C	1C

+ LiR-P serial configuration with LiStorage 10.2 P-100V



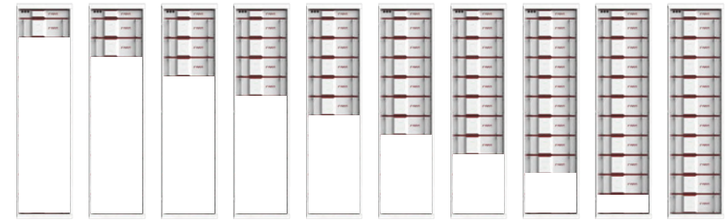
Nominal Capacity (Ah)	100	100	100	100	100	100	100	100	100	100
Nominal Energy (kWh)	10,24	20,48	30,72	40,96	51,2	61,44	71,68	81,92	92,16	102,4
Energy Usable (DoD 80%) (kWh)	8,192	16,384	24,576	32,768	40,96	49,152	57,344	65,536	73,728	81,92
Nominal Voltage (V)	102,4	204,8	307,2	409,6	512	614,4	716,8	819,2	921,6	1024
Minimum Voltage (Cut-off) (V)	80	160	240	320	400	480	560	640	720	800
Maximum Voltage (V)	115,2	230,4	345,6	460,8	576	691,2	806,4	921,6	1036,8	1152
Nominal Discharge	1C	1C	1C	1C	1C	1C	1C	1C	1C	1C
Maximum Current in Discharge	2C	2C	2C	2C	2C	2C	2C	2C	2C	2C
Peak in Discharge (10s)	3C	3C	3C	3C	3C	3C	3C	3C	3C	3C
Nominal in Charge	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C
Maximum Current in Charge (25°C)	1C	1C	1C	1C	1C	1C	1C	1C	1C	1C
Peak in Charge (10s)	2C	2C	2C	2C	2C	2C	2C	2C	2C	2C

+ LiR-E serial configuration with LiStorage 10.2 E-48V



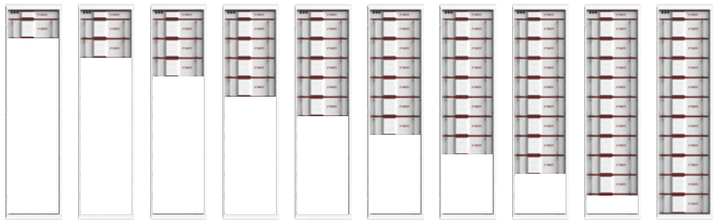
Nominal Capacity (Ah)	200	200	200	200	200	200	200	200	200	200
Nominal Energy (kWh)	10,24	20,48	30,72	40,96	51,2	61,44	71,68	81,92	92,16	102,4
Energy Usable (DoD 80%) (kWh)	8,192	16,384	24,576	32,768	40,96	49,152	57,344	65,536	73,728	81,92
Nominal Voltage (V)	51,2	102,4	153,6	204,8	256	307,2	358,4	409,6	460,8	512
Minimum Voltage (Cut-off) (V)	40	80	120	160	200	240	280	320	360	400
Maximum Voltage (V)	57,6	115,2	172,8	230,4	288	345,6	403,2	460,8	518,4	576
Nominal Discharge	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C
Maximum Current in Discharge	1C	1C	1C	1C	1C	1C	1C	1C	1C	1C
Peak in Discharge (10s)	2C	2C	2C	2C	2C	2C	2C	2C	2C	2C
Nominal in Charge	0,25C	0,25	0,25C	0,25C	0,25C	0,25C	0,25C	0,25C	0,25C	0,25C
Maximum Current in Charge (25°C)	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C
Peak in Charge (10s)	1C	1C	1C	1C	1C	1C	1C	1C	1C	1C

+ LiR-P serial configuration with LiStorage 10.2 P-48V



Nominal Capacity (Ah)	200	200	200	200	200	200	200	200	200	200
Nominal Energy (kWh)	10,24	20,48	30,72	40,96	51,2	61,44	71,68	81,92	92,16	102,4
Energy Usable (DoD 80%) (kWh)	8,192	16,384	24,576	32,768	40,96	49,152	57,344	65,536	73,728	81,92
Nominal Voltage (V)	51,2	102,4	153,6	204,8	256	307,2	358,4	409,6	460,8	512
Minimum Voltage (Cut-off) (V)	40	80	120	160	200	240	280	320	360	400
Maximum Voltage (V)	57,6	115,2	172,8	230,4	288	345,6	403,2	460,8	518,4	576
Nominal Discharge	1C	1C	1C	1C	1C	1C	1C	1C	1C	1C
Maximum Current in Discharge	2C	2C	2C	2C	2C	2C	2C	2C	2C	2C
Peak in Discharge (10s)	3C	3C	3C	3C	3C	3C	3C	3C	3C	3C
Nominal in Charge	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C
Maximum Current in Charge (25°C)	1C	1C	1C	1C	1C	1C	1C	1C	1C	1C
Peak in Charge (10s)	2C	2C	2C	2C	2C	2C	2C	2C	2C	2C

+ LiR-E parallel configuration with LiStorage 10.2 E-100V



Nominal Capacity (Ah)	100	100	100	100	100	100	100	100	100	100
Nominal Energy (kWh)	10,24	20,48	30,72	40,96	51,2	61,44	71,68	81,92	92,16	102,4
Energy Usable (DoD 80%) (kWh)	8,192	16,384	24,576	32,768	40,96	49,152	57,344	65,536	73,728	81,92
Nominal Voltage (V)	102,4	204,8	307,2	409,6	512	614,4	716,8	819,2	921,6	1024
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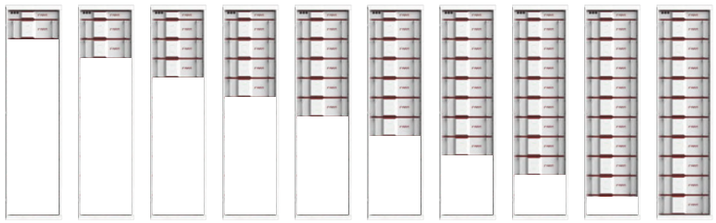
Maximum Voltage (V)	115,2	230,4	345,6	460,8	576	691,2	806,4	921,6	1036,8	1152
Nominal Discharge	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C
Maximum Current in Discharge										
Peak in Discharge (10s)										
Nominal in Charge	on customer request									
Maximum Current in Charge (25°C)										
Peak in Charge (10s)										

+ LiR-E parallel configuration with LiStorage 10.2 E-48V



Nominal Capacity (Ah)	200	200	200	200	200	200	200	200	200	200
Nominal Energy (kWh)	10,24	20,48	30,72	40,96	51,2	61,44	71,68	81,92	92,16	102,4
Energy Usable (DoD 80%) (kWh)	8,192	16,384	24,576	32,768	40,96	49,152	57,344	65,536	73,728	81,92
Nominal Voltage (V)	51,2	102,4	153,6	204,8	256	307,2	358,4	409,6	460,8	512
Minimum Voltage (Cut-off) (V)	40	80	120	160	200	240	280	320	360	400
Maximum Voltage (V)	57,6	115,2	172,8	230,4	288	345,6	403,2	460,8	518,4	576
Nominal Discharge	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C	0,5C
Maximum Current in Discharge										
Peak in Discharge (10s)										
Nominal in Charge	on customer request									
Maximum Current in Charge (25°C)										
Peak in Charge (10s)										

LiBESS CONFIGURATION

20 FT Container

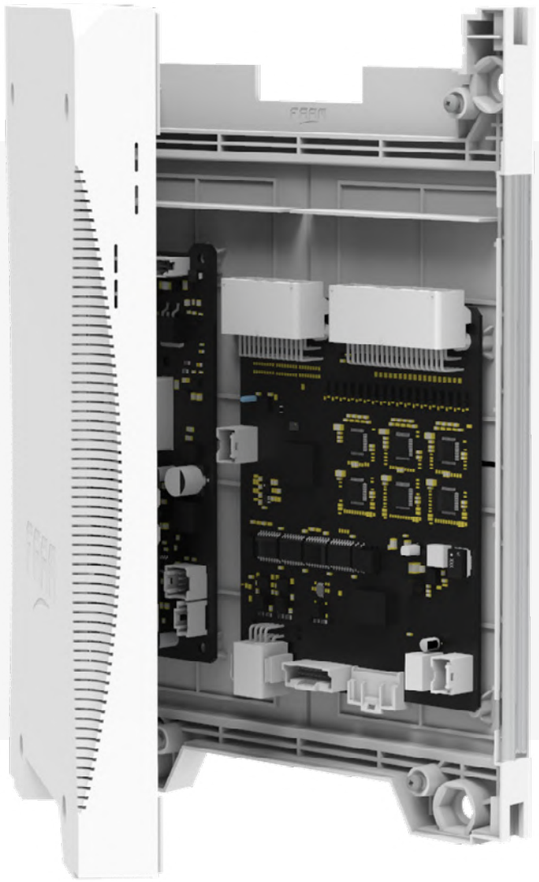
External Mesure	5,86 x 2,31 x 2,36 m
Nominal Energy	up to 1.84 MWh
Total energy	up to 1,6 MWh

40 FT Container

External Mesure	12,2 x 2,34 x 2,68 m
Nominal Energy	up to 3.89 MWh
Total energy	up to 3,8 MWh

TOTAL BATTERY CONTROL

Monitoring, protection and communication



Protection levels as for both Cell Voltage and Cell Temperature (the most important ones as for lithium safety) are implemented. The first one by **SW**, the second one by pure **HW**. The latter acts as a further protection in case of failure of the **SW** one (uC failure).

TEVEROLA PLANT

Lithium Technology production plant

Start up: Q1 2021, **Complex area:** 280.000 sqm, **Cap:** 330 MWh, **Technology:** Gen 1 LFP soft pouch, **Investment:** 62M€
Investment: 36,7 M€ subsized/grant from Italian Gov, **Applications:** Motive Power, ESS, Public transport, Naval and Defense

In 2019 **SERI Group** presented to the **Italian Ministry of Economical Development and Research** a project aiming to industrialize next generation Li-ion cells.

The project, approved by the **European Commission**, leads to the building of a second plant in Teverola with a capacity of 8.5 GWh.

The project will take 7 years (2020-2027) with the final result of developing even a technology for the recycle of end of life Li-ion batteries in agreement with the mission of **FAAM** of a green and circular economy.

The name of the project is I**PCEI** which aims to support the creation of a European supply chain for Li-ion batteries. It involves 32 companies (5 are Italian), which shared a non-refundable aid of 3.2 billion Euros. The Italian public contribution is 450 million Euros, of which 505 million Euro granted to **FAAM** (basically all the part released for Italy).

DEVELOPMENT THROUGH NATURE BALANCING

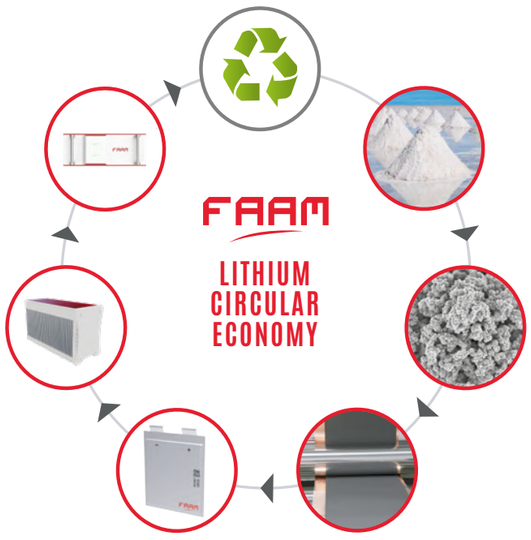
FAAM brand, owned by **Seri Industrial SpA**, is producing high energy efficiency storage systems since 1974. Starting from Year 2000, even with the projection of customized solutions of lithium batteries, **FAAM** produced its first lithium based solution in 2004 including an innovative management system (BMS).

Supplying a real Made in Italy product, **FAAM** owns the full knowledge as well as the entire value chain including an international agreement in the control of the Lithium raw material.

FUTURE CIRCULAR ECONOMY

Repeating what has been achieved for lead batteries, realizing autonomously, without resorting to Asian suppliers, the cells for the production of lithium batteries starting from lithium carbonate, with which the active material lithium-iron-phosphate is realized.

Through this project a highly customized and innovative product will be proposed to the market, being able to control the entire production process and adapting, starting from the raw material, the product to the needs of customers.



WHY CHOOSE FAAM?

Full Integrated Production Process

Starting from the full control on the raw materials as well as the production process supported by customized technologies and defined plants – from the lithium extraction, to the cells ad modules manufacturing, the pack assembling, and after the use, the recycle and subsequent reuse – **FAAM** is able to guarantee the highest quality.

Tailor-Made Solution

Our customers are our number one priority, we want to fundamentally contribute to their quality of life and quality of business. Our engineering team, characterized by a strong spirit of initiative, curiosity and recognized expertise, starts from the analysis of the customers' needs to the elaboration of a customized project including tailor-made solutions in co-developing with its customers.

Solid Company Background

Seri Industrial SpA, listed on the MTA market, is a strong financial partner with the duty and honor of pursuing continued growth thanks to its Innovation attitude and culture in sustaining Research & Development. **FAAM** includes over 45 years of recognized specific expertise in all batteries industrial applications and operate with the goal of exceeding customers' expectations.

Sustainable Growth

Being environmentally responsible is one of **SERI**'s main commitments. Aiming the best technologies for the total recovery of the batteries, the company thinks, develops and produces innovative solutions that focus on the environment. Our goal is continuos improvement, in terms of quality management and innovation on product, process and environmental protection throughout sustainable solutions for people, territory and environment.