Saft lithium batteries

Selector guide

saft
a company of
TOTAL

Saft, your trusted partner
for reliable high-quality batteries



The solution you need.
The performance you demand.

Saft is a world leader in the design and manufacture of advanced technology batteries for industrial and defence applications. In fact, Saft pioneered the development and production of both primary lithium cells and lithium-ion technology, and continues today to invest in the development of technologies and solutions that serve the evolving needs of its customers around the world.

When it comes to innovative, robust and reliable batteries, no one can match Saft.

Your complex systems, your high-tech equipment and your state-of-the-art devices deserve batteries that are just as focused on performance and reliability as you are. Around the world, both our off-the-shelf batteries and our made-to-measure solutions serve as key components in military equipment, alarms, electronic and medical devices, transport tracking devices, smart metering systems, tools for the oil & gas industry, space systems, and much more.

Saft has what you need. We are the world's leading supplier of lithium-based standard and customised battery systems for industrial and professional applications.

Focused on innovation

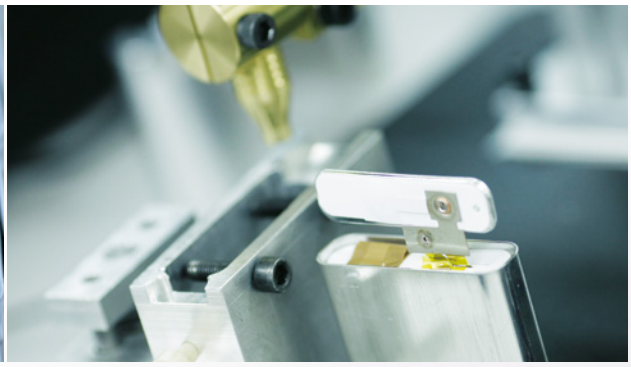
For an advanced technology company such as Saft, research and development are a constant. We are always building on our previous achievements and seeking ways to improve existing products and implement new technologies as customers' needs evolve.

Quality as a way of life

Saft's founding strategy is to provide customers with the best battery solutions available.
We implement best practices in all fields, and consider high performance and rigorous discipline as our standard operating procedure.

Transport and safety

Saft's packaging, labeling and shipping practices conform to the highest levels of international standards governing battery testing and classification.
This allows us to ensure safe and secure transportation and storage to anywhere in the world.



Global presence

Saft has operations in 18 countries with 14 manufacturing sites across Europe, North America and Asia.

4,300+
people worldwide

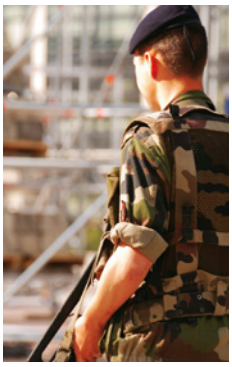
3,000+
customers

18
countries

14
manufacturing sites

A lithium battery that meets **your application's needs**






Whether you choose from one of our three primary lithium technologies or from our rechargeable lithium-ion range,,Saft has the right lithium battery for your application.

	Primary lithium			Rechargeable lithium	
	LS/LSH/LSP	LO/G	LM/M	MP	Small VL
Internet of Things (IoT) Smart parking sensors, Industrial IoT, environment monitoring equipment, dataloggers, smart energy management systems, smart building equipment	■		■	■	■
Marine & signaling Buoys, beacons, lighthouses, safety jackets, oceanography	■	■	■	■	■
Medical Defibrillators, respirators & oxygen concentrators, monitoring equipment, mobile diagnostic equipment, infusion pumps, telemedicine equipment		■	■	■	
Military & defence Portable radio communications, night vision equipment & thermal imagers, tactical engagement simulators, precision gunnery simulators, chemical agent detectors, field radars, munitions & firing systems, torches & lamps	■	■	■	■	■
Oil & gas Measurement while drilling (MWD), logging while drilling (LWD), well completion & well production tools, subsea equipments, explosive atmosphere devices, seismic survey equipment, pipeline inspection gauges (PIG)	■		■	■	■
Professional electronics Professional handheld tools and portable devices, professional displays, ticketing & information kiosks, vehicle telematics	■		■	■	
Security & alarms Home and pool surveillance, smoke and CO_2 detectors, locking systems, video surveillance, wireless sirens, call points, PIR presence detectors, glass break detectors, perimeter protection, biometric readers, contact-less card readers and complete wireless alarm systems.	■		■	■	
Tracking Asset tracking equipment, vehicle tracking systems, tollgate transponders	■	■	■		
Utility metering Automatic meter reading (AMR), advanced metering infrastructure (AMI), traditional metering, smart metering systems for electricity, water, gas, and heat, fixed telecommunication devices for Wide Area Network	■		■	■	■

MEDICAL

INTERNET OF THINGS

MILITARY & DEFENCE

UTILITY METERING

MACHINE TO MACHINE

SECURITY & ALARMS

OIL & GAS

PROFESSIONAL ELECTRONICS

TRACKING

MARINE & SIGNALING

Whatever your applications, you can count on Saft batteries.

Saft primary lithium

An offer ranging from single cylindrical cells to complex battery systems

Three distinct technologies

- Lithium-thionyl chloride (Li-$SOCl_2$) for our LS/LSH cells (3.6 V)
- Lithium-sulfur dioxide (Li-SO_2) for our LO/G cells (3.0 V)
- Lithium manganese dioxide (Li-MnO_2) for our LM/M cells (3.0 V)

High and stable operating voltage

Above 3 V for LS/LSH cells and above 2 V for LO/G and LM/M cells

Wide range of current capabilities

From a few microamperes base current to more than 10 A pulses for some LO/G and LM/M cells

Wide range of operating temperatures

From – 60°C to + 85°C, depending on cells, current drain and environmental conditions. Our LSH 20-150 cell will operate safely and reliably up to + 150°C

Long shelf life

From less than 1 % to maximum 3 % annual capacity loss in storage at + 20°C

Extended operating life

Typically more than 5 years, and up to 20 years or more for some applications

High energy densities

Three to ten times greater than non-lithium systems

Excellent behavior in humid environments

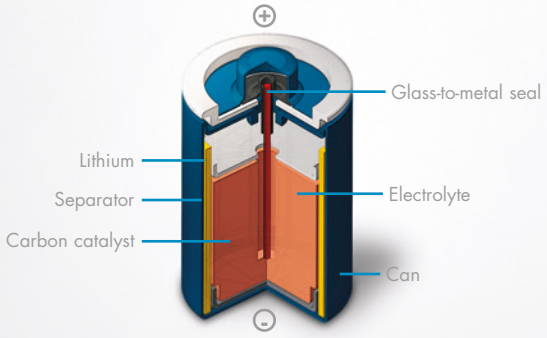
Corrosien-free, hermetically-sealed cans

Safety

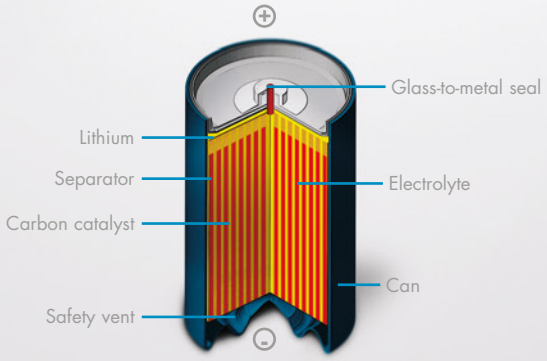
All of Saft's lithium cells meet UL and IEC standards, and are certified in accordance with UN transport regulations. Most battery packs comply with European and US military standards. Several LS/M models comply with the IEC 60079-11 Part 10.5 "Intrinsic Safety" specifications for ATEX applications.

High quality cell construction

Stainless steel or nickel-plated cans
Laser welding & glass-to-metal seals
Safety vents (for spiral designs)
Built-in fuses or PTC (for spiral design)
Shutdown separator (for MnO_2)

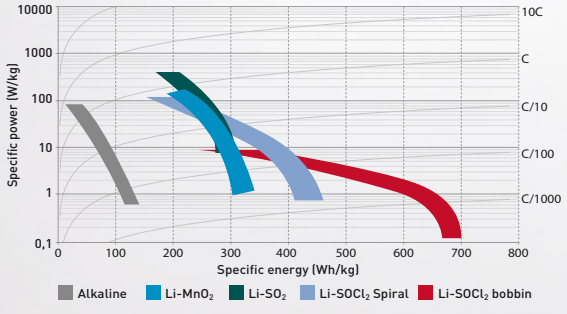


Bobbin construction (LS range)

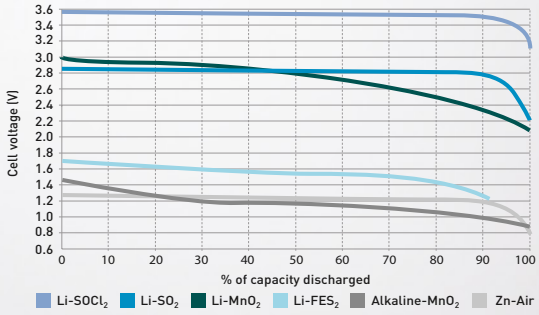


Spiral construction (LSH, LM, M, LO, G range)

A wide range of power densities



Performance comparison of different technologies



Li-$SOCl_2$ product range

High energy, high voltage, high pulse capability, long life, wide temperature range

Lithium-thionyl chloride (Li-$SOCl_2$) batteries from Saft

- Operating voltage: 3.6 V
- Bobbin or spiral construction
- Lowest self-discharge for extended operating life
- Well controlled passivation
- Operating temperature: - 60°C to + 150°C
- LS cells compliant with IEC 60079-11 Part 10.5 Intrinsic Safety for ATEX applications
- Non-flammable electrolyte
- Excellent resistance to corrosion
- Low magnetic signature

Bobbin LS cells are designed specifically for long term (5 to 20+ years) applications, featuring a few µA base currents and periodic pulses, typically in the 5-150 mA range.

Spiral LSH cells are designed for long term (2 to 10+ years) applications, featuring a few mA base currents and periodic pulses, typically in the 50 mA-2 A range, and for applications requiring continuous currents in the 0.1-1.8 A range.

	ENERGY						POWER		
	LS 14250	LS 14500	LS 17330	LS 17500	LS 26500	LS 33600	LSH 14 Light	LSH 14	LSH 20
Cell size	1/2 AA	AA	2/3 A	A	C	D	C	C	D
Cell construction	Bobbin	Bobbin	Bobbin	Bobbin	Bobbin	Bobbin	Spiral	Spiral	Spiral
Nominal voltage	3.6 V	3.6 V	3.6 V	3.6 V	3.6 V	3.6 V	3.6 V	3.6 V	3.6 V
Nominal capacity	1.2 Ah	2.6 Ah	2.1 Ah	3.6 Ah	7.7 Ah	17.0 Ah	3.6 Ah	5.8 Ah	13.0 Ah
Max. continuous current	35 mA	50 mA	25 mA	100 mA	150 mA	250 mA	1.3 A	1.3 A	1.8 A
Max. pulse discharge rate	0.1 A	0.25 A	0.12 A	0.25 A	0.3 A	0.4 A	2.0 A	2.0 A	4.0 A
Max. outside diameter	14.55 mm	14.55 mm	16.5 mm	17.13 mm	26.0 mm	33.4 mm	26.0 mm	26.0 mm	33.4 mm
Max. height	25.15 mm	50.3 mm	33.4 mm	50.9 mm	50.4 mm	61.6 mm	50.4 mm	50.4 mm	61.6 mm
Typical weight	8.9 g	16.7 g	14.4 g	21.9 g	48 g	90 g	51 g	51 g	100 g
Operating temperature range	- 60 / + 85°C	- 60 / + 85°C	- 60 / + 85°C	- 60 / + 85°C	- 60 / + 85°C	- 60 / + 85°C	- 60 / + 85°C	- 60 / + 85°C	- 60 / + 85°C

Typical values relative to cells stored for one year or less at + 30°C max ; Performances vary according to discharge characteristics (current, duration, frequency), temperature conditions, storage conditions prior to usage and applications acceptable minimum voltage.

	HIGH TEMPERATURE		HIGH PULSE	
	LSH 20-HTS	LSH 20-150	LSP 26500	LSP 33600
Cell size	D	D	C	D
Cell construction	Spiral	Spiral	Hybrid	Hybrid
Nominal voltage	3.6 V	3.6 V	3.6 V	3.6 V
Nominal capacity	11.0 Ah	14.0 Ah	7.7 Ah	17.0 Ah
Max. continuous current	1.0 A	300 mA	150 mA	250 mA
Max. pulse discharge rate	3.0 A	0.5 A	2 A for 1 s	2 A for 1 s
Max. outside diameter	33.4 mm	32.05 mm	26.5 mm	33.5 mm
Max. height	61.6 mm	61.7 mm	52 mm	62.5 mm
Typical weight	100 g	104.5 g	51 g	93 g
Operating temperature range	- 60 / + 85°C	- 40 / + 150°C	- 30 / + 60°C	- 30 / + 60°C

Typical values relative to cells stored for one year or less at + 30°C max ; Performances vary according to discharge characteristics (current, duration, frequency), temperature conditions, storage conditions prior to usage and applications acceptable minimum voltage.

High Temperature cells series are designed for operating in extreme conditions with temperature as high as +150°C for LSH 20-150.

Hybrid LSP range consists in a LS bobbin cell assembled in parallel with an EDLC-type component, selected to sustain high amplitude / long duration pulses. Please, consult Saft.

Unrivaled performances in long-life applications (LS, LSH series)
Safe and reliable operations up to + 150°C (high temperature series)
Hybrid solutions with best-in-class selected pulse sustaining components (New LSP series)

Li-SO_2 product range

High power, excellent functionality in cold environments

Lithium-sulfur dioxide (Li-SO_2) batteries from Saft

- Operating voltage: 2.8 V
- Operating temperature: – 40°C to + 70°C
- Spiral construction
- Non-flammable electrolyte
- Superior pulse capacity
- Excellent capacity above 1 A
- Superior power at – 40°C
- Wide acceptance for military use
- Well controlled passivation
- Low self-discharge during storage

LO/G spiral cells are designed for applications featuring continuous currents in the 0.1-5 A range, with superimposed pulses as high as 20 A.

	POWER						HIGH POWER				
	LO 34 SX	LO 35 SX	LO 40 SX	LO 26 SX	LO 26 SXC	LO 25 SX	LO 29 SHX	LO 43 SHX	LO 30 SHX	LO 26 SHX	LO 39 SHX
Cell size	1/3 C	2/3 C	2/3 thin D	D	D	Fat D	C	5/4 C	Thin D	D	F
Cell construction	Spiral	Spiral	Spiral	Spiral	Spiral	Spiral	Spiral	Spiral	Spiral	Spiral	Spiral
Nominal voltage	2.8 V	2.8 V	2.8 V	2.8 V	2.8 V	2.8 V	2.8 V	2.8 V	2.8 V	2.8 V	2.8 V
Nominal capacity	1.0 Ah	2.2 Ah	3.5 Ah	7.75 Ah	9.2 Ah	8.0 Ah	3.75 Ah	5.0 Ah	5.75 Ah	7.5 Ah	11.5 Ah
Max. continuous current	0.5 A	2.0 A	2.0 A	2.5 A	2.5 A	2.5 A	2.5 A	2.5 A	3.0 A	4.0 A	3.0 A
Max. pulse discharge rate	1.0 A	5.0 A	5.0 A	5.0 A	10.0 A	10.0 A	6.0 A	10.0 A	10.0 A	15.0 A	60.0 A
Max. outside diameter	25.6 mm	25.9 mm	28.95 mm	34.2 mm	34.2 mm	39.5 mm	25.6 mm	26.0 mm	29.1 mm	34.2 mm	31.9 mm
Max. height	20.45mm	35.9 mm	42.29 mm	59.3 mm	59.3 mm	50.3 mm	50.4 mm	59.2 mm	62.5 mm	59.3 mm	100.3 mm
Typical weight	16 g	30 g	40 g	85 g	85 g	96 g	40 g	53 g	63 g	85 g	125 g
Operating temperature range	- 40 / + 70°C	- 60 / + 70°C	- 60 / + 70°C	- 60 / + 70°C	- 60 / + 70°C	- 60 / + 70°C	- 60 / + 70°C	- 60 / + 70°C	- 60 / + 70°C	- 60 / + 70°C	- 60 / + 70°C

Typical values relative to cells stored for one year or less at + 30°C max ; Performances vary according to discharge characteristics (current, duration, frequency), temperature conditions, storage conditions prior to usage and applications acceptable minimum voltage.

	POWER						
	G 06/2	G 36/2	G 52/3	G 54/3	G 26	G 22/6	G 62/1
Cell size	AA	Long A	C	5/4 C	D	DD	Long fat DD
Cell construction	Spiral	Spiral	Spiral	Spiral	Spiral	Spiral	Spiral
Nominal voltage	2.8 V	2.8 V	2.8 V	2.8 V	2.8 V	2.8 V	2.8 V
Nominal capacity	0.95 Ah	1.7 Ah	3.2 Ah	5.0 Ah	7.75 Ah	16.5 Ah	34.0 Ah
Max. continuous current	0.5 A	1.5 A	2.5 A	2.5 A	2.5 A	3.0 A	8.0 A
Max. pulse discharge rate	0.8 A	2.5 A	5.0 A	5.0 A	5.0 A	10.0 A	12.0 A
Max. outside diameter	14.2 mm	16.3 mm	25.6 mm	25.6 mm	34.5 mm	33.3 mm	41.7 mm
Max. height	50.3 mm	57.7 mm	49.5 mm	60.2 mm	59.8 mm	120.6 mm	141.0 mm
Typical weight	15 g	18 g	47 g	58 g	85 g	175 g	300 g
Operating temperature range	- 60 / + 70°C	- 60 / + 70°C	- 60 / + 70°C	- 60 / + 70°C	- 60 / + 70°C	- 60 / + 70°C	- 60 / + 70°C

Typical values relative to cells stored for one year or less at + 30°C max ; Performances vary according to discharge characteristics (current, duration, frequency), temperature conditions, storage conditions prior to usage and applications acceptable minimum voltage.

Superior power down to – 40° C
Excellent energy density under high discharge rates
Fully hermetic seals up to + 95° C

Li-MnO_2 product range

High power and high energy with no passivation

Lithium manganese dioxide (Li-MnO_2) batteries from Saft

- Operating voltage: 3 V
- Operating temperature: – 40°C to + 80°C
- Spiral construction
- Non-corrosive electrolyte
- Cells non-pressurised at room temperature
- High pulse capability
- Minimal voltage delay
- Competitive capacity at high current and low temperatures (– 40°C)
- Low self-discharge compatible with long storage duration and extended operating life

Spiral cells designed specifically for applications featuring continuous currents in the 0.1-5 A range, with superimposed pulses as high as 5 A. Excellent resistance to passivation, even after long-term storage in uncontrolled temperature environments.

	POWER					HIGH POWER		
	M 52	M 56	M 19	M 20	M 62	M 52 HR	M 19 HR	M 20 HR
Cell size	C	5/4 C	Short D	D	DD	C	Short D	D
Cell construction	Spiral	Spiral	Spiral	Spiral	Spiral	Spiral	Spiral	Spiral
Nominal voltage	3.0 V	3.0 V	3.0 V	3.0 V	3.0 V	3.0 V	3.0 V	3.0 V
Nominal capacity	5.6 Ah	6.7 Ah	10.3 Ah	12.6 Ah	33.0 Ah	4.8 Ah	10.3 Ah	11.5 Ah
Max. continuous current	2.0 A	2.5 A	3.0 A	3.5 A	6.0 A	2.0 A	4.0 A	4.0 A
Max. pulse discharge rate	4.0 A	6.0 A	7.5 A	8.0 A	12.0 A	5.0 A	10.0 A	10.0 A
Max. outside diameter	26.2 mm	26.2 mm	33.5 mm	34.2 mm	42.5 mm	26.2 mm	33.5 mm	34.2 mm
Max. height	51.5 mm	61.5 mm	58.5 mm	61.5 mm	133.0 mm	51.5 mm	58.5 mm	61.5 mm
Typical weight	58 g	70 g	105 g	117 g	355 g	59 g	107 g	117 g
Operating temperature range	- 40 / + 72°C	- 40 / + 72°C	- 40 / + 72°C	- 40 / + 72°C	- 40 / + 72°C	- 40 / + 72°C	- 40 / + 72°C	- 40 / + 72°C

Typical values relative to cells stored for one year or less at + 30°C max ; Performances vary according to discharge characteristics (current, duration, frequency), temperature conditions, storage conditions prior to usage and applications acceptable minimum voltage.

	POWER				ATEX	
	LM 17130	LM 17500	LM 26500	LM 33600	M 52 Ex SV	M 20 Ex SV
Cell size	1/3 A	A	C	D	C	D
Cell construction	Spiral	Spiral	Spiral	Spiral	Spiral	Spiral
Nominal voltage	3.0 V	3.0 V	3.0 V	3.0 V	3.0 V	3.0 V
Nominal capacity	0.5 Ah	3.0 Ah	7.4 Ah	13.4 Ah	5.6 Ah	12.4 Ah
Max. continuous current	0.3 A	1.5 A	2.0 A	4.0 A	2.0 A	3.5 A
Max. pulse discharge rate	0.4 A	2.0 A	4.0 A	8.0 A	4.0 A	8.0 A
Max. outside diameter	16.7 mm	17.5 mm	26.0 mm	33.7 mm	26.2 mm	34.2 mm
Max. height	16.33 mm	51.5 mm	51.5 mm	61.3 mm	51.5 mm	61.5 mm
Typical weight	8 g	28 g	61 g	113 g	58 g	115 g
Operating temperature range	- 40 / + 70°C	- 40 / + 85°C	- 40 / + 85°C	- 40 / + 85°C	- 40 / + 72°C	- 40 / + 72°C

The EX-range provides a high energy density and are certified according to ATEX/ IECEx by an independent certification body. The cells are fuly compliant with the IEC 60079-11 standard (Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "I").

High capacity at high current and low temperatures
Minimal voltage delay
Intrinsically safe designs for high power applications

Saft rechargeable lithium-ion

Cutting-edge technology for high performance

Four distinct technologies

- Lithium mixed oxide (NMC/NCA) for MP xlr and small VL xlr ranges (3.65 volt) for energy applications
- Saft's specific MP xc Li-ion technology for extreme cold environments
- Saft's specific MP xtd Li-ion technology for extended life and temperatures, with the MP ise specifically designed as an ATEX compatible component
- Saft's specific VL32600-125 high temperature Li-ion technology for applications involving temperatures up to + 125°C

Small and lightweight

With specific energies up to 180 Wh/kg, Saft's Li-ion technologies are

- Four to ten times lighter
- 50 % to 85 % less volume than conventional batteries, depending on the application

Extended operating life

In most circumstances, Saft's Li-ion technologies will more than double the operating lifetime as compared to competitor's cells. This extended life can take place over a broad temperature range, beyond that of most commercial cells.

Wide temperature range

Saft's Li-ion technologies offer unique performances in unregulated outdoor conditions or in extreme conditions, either hot or cold.

Flexibility of design

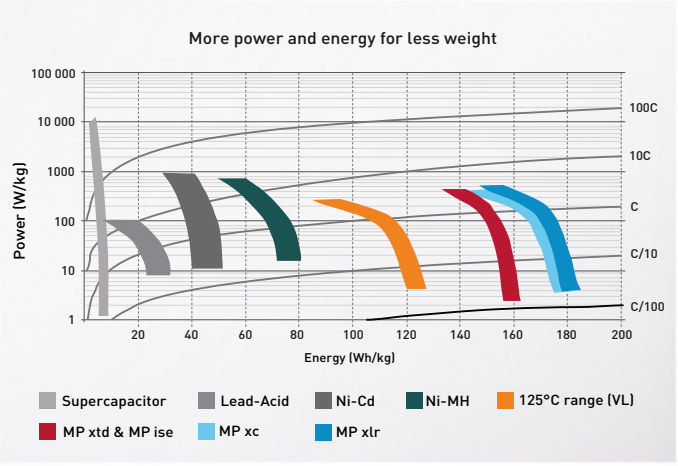
Cylindrical and prismatic formats

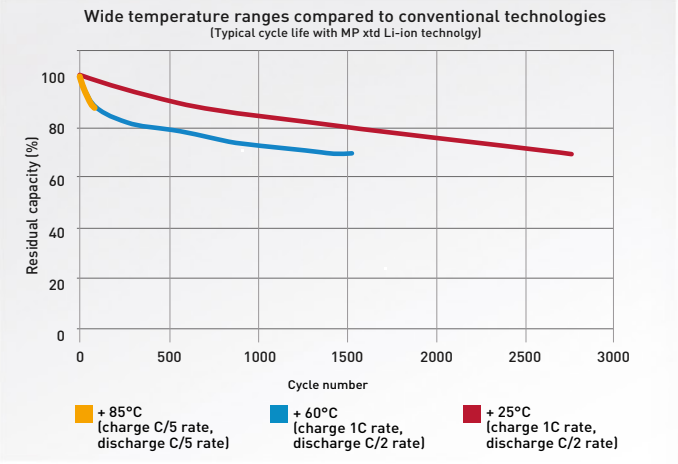
Rugged design

Saft's Li-ion cells and batteries are designed to meet the harsh environments of industrial & defence applications

Safety

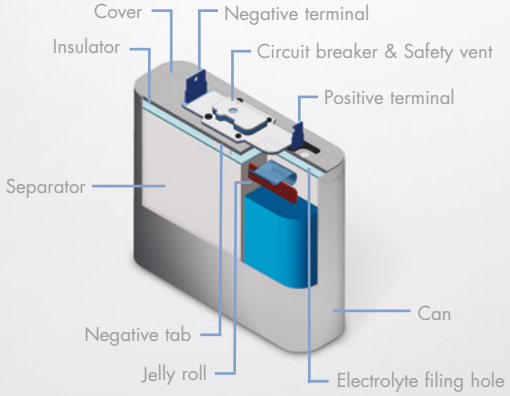
All of Saft's Li-ion cells meet UL and IEC standards, and are certified in accordance with UN transport regulations. Our military batteries comply with European and US military standards. Saft's MP xtd cells are compatible with IEC 60079-11 requirements for intrinsic safety. Talk to Saft for further details.

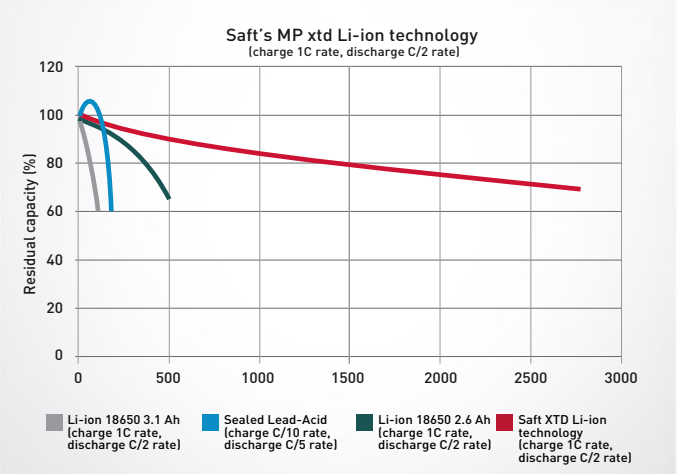




High quality cell construction

Stainless steel or aluminum can Mechanical vent
Built-in mechanical circuit breaker
Three-layer shutdown separator





Li-ion product range

Greater energy density, wider temperature and longer life

Lithium-ion (Li-ion) batteries from Saft

- Extended lifetime in cycling, floating and calendar conditions, even at high temperature
- Unrivalled operating temperature range: - 35°C to + 60°C for Saft's MP xlr range and - 40°C to + 85°C for Saft's MP xtd range.
- High operating voltage: 4.2-2.5 V range
- Unrivalled low and high temperature performance
- High energy density: up to 385 Wh/l and 180 Wh/kg
- Maintenance-free reliability
- Low life cycle cost
- Saft's MP ise cells are compatible with IEC 60079-11 requirements for intrinsic safety. Consult Saft for further details.

	ENERGY				EXTREME COLD	EXTENDED LIFE & TEMPERATURE		HIGH TEMPERATURE
	VL 34570 xlr	MP 144350 xlr	MP 174865 xlr	MP 176065 xlr	MP 176065 xc	MP 174565 xtd	MP 176065 xtd	VL 32600-125
Form factor	Cylindrical D	Prismatic	Prismatic	Prismatic	Prismatic	Prismatic	Prismatic	Cylindrical D
Nominal voltage	3.65 V	3.65 V	3.65 V	3.65 V	3.65 V	3.65 V	3.65 V	3.6 V
Nominal capacity	5.4 Ah	2.6 Ah	5.3 Ah	6.8 Ah	6.4 Ah	4.0 Ah	5.6 Ah	4.5 Ah
Max. continuous discharge current	11.0 A	5.0 A	10.0 A	14.0 A	13.0 A	8.0 A	11.0 A	2.3 A
Max. pulse discharge rate	21.0 A	10.0 A	21.0 A	27.0 A	26.0 A	16.0 A	22.0 A	3.4 A
Max. charge current	5.4 A	2.6 A	5.0 A	6.8 A	6.5 A	4.0 A	5.6 A	0.9 A
Cycle life (Cycled to 70 % of the cells original capacity)	>600 (100 % DoD, C/2-C/2, + 20°C)	1100 (100 % DoD, C-C/2, + 20°C)	950 (100 % DoD, C-C/2, + 20°C)	1800 (100 % DoD, C-C/2, + 20°C)	800 (100 % DoD, C-C/2, + 20°C)	2700 (100 % DoD, C-C/2, + 25°C)	2700 (100 % DoD, C-C/2, + 25°C)	30 (100 % DoD, C/5-C/5, + 125°C)
Discharge temperature range	- 35 / + 60°C	- 35 / + 60°C	- 35 / + 60°C	- 35 / + 60°C	- 50 / + 60°C	- 40 / + 85°C	- 40 / + 85°C	0 / + 125°C
Charge temperature range	- 30 / + 60°C	- 30 / + 60°C	- 30 / + 60°C	- 30 / + 60°C	- 30 / + 60°C	- 30 / + 85°C	- 30 / + 85°C	0 / + 125°C

Typical values relative to cells stored for one year or less at + 30°C max; Performances vary according to discharge characteristics (current, duration, frequency), temperature conditions, storage conditions prior to usage and applications acceptable minimum voltage.

	Atex compliant component cells IEC 60079-11 (10.5.2 and 10.5.3 (b))	
	MP 174565 ise[1]	MP 176065 ise[1]
Form factor	Prismatic	Prismatic
Nominal voltage	3.65 V	3.65 V
Nominal capacity	4.0 Ah	5.6 Ah
Max. continuous discharge current	8.0 A	11.0 A
Max. pulse discharge rate	16.0 A	22.0 A
Max. charge current	4.0 A	5.6 A
Cycle life (Cycled to 70 % of the cells original capacity)	2300 (100 % DoD, C/2-C, + 20°C)	2200 (100 % DoD, C/2-C, + 20°C)
Discharge temperature range	- 30 / + 60°C	- 30 / + 60°C
Charge temperature range	- 30 / + 60°C	- 30 / + 60°C

[1] IECEx Partial Test Report is avialble on request.

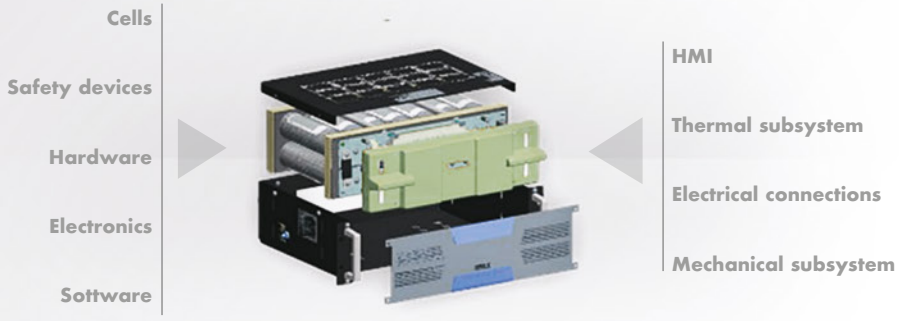
Extended life time even at extreme temperatures
Ruggedized design for demanding industrial & defense applications

Saft battery systems & chargers
Custom solutions and adaptations to fit your specific need

Beyond simply selling individual cells, Saft can also provide complex battery systems that offer management, control and communication capabilities in addition to electrical and mechanical interfaces. These systems also include the charger where applicable.

If you have very specific needs, Saft can also develop custom battery systems and adaptations that fit perfectly with existing products. Wherever possible, custom batteries are designed and made from standard components and subassemblies.

To build your custom solution, Saft's unique management algorithms are combined with our proprietary electronics to bring optimised performance, long shelf and service life, and guaranteed user safety.



Saft experts will work with your teams to select the best electrochemistry for your needs, define the proper battery architecture, choose electronics, determine the mechanical design, qualify the battery produced and provide support for the entire life of your solution. You get a battery that is optimised for your specific application, and you benefit from high levels of certainty in your project's timing, cost and proper functionality.

Chargers
Rugged products for field use

Saft's EcMC² chargers are state-of-the-art, rugged, multi-channel, multi-position and multi-chemistry products. They are designed for easy transport and operation. They automatically recognise the type of battery needing charging, and can recharge a number of different batteries simultaneously, regardless of their state of charge or chemistry.

Saft EcMC² mobile multi-technology chargers

- Available in 250-watt (for battlefield and tactical use) and 350-watt (for base of operations)
- Automatic battery type recognition
- Simultaneous charging in extreme operational conditions
- Compact & lightweight
- Rugged design for demanding field use
- Compliant with MIL standards

Saft, your trusted partner
for reliable high-quality batteries



Beyond knowing you can trust the quality of our extremely wide range of primary and rechargeable lithium battery offer, manufacturers and OEMs can also count on Saft's teams of experts and their comprehensive services covering every step of the manufacturing cycle:

Handle, store, transport and dispose of your batteries safely



Saft primary lithium and rechargeable lithium-ion cells are recognised by Underwriters Laboratories (UL) (components), compliant with IEC 60086-4, IEC 62133-2, and UL1642 safety standards and compliant with UN regulations for the transportation of dangerous goods.

Some of our cells are compatible with the IEC 60079-11 intrinsic safety standard. Enhanced, extra-robust cells and batteries are also available for use in potentially explosive atmospheres in both primary lithium $SOCl_2$ and MnO_2 chemistries.

General Recommendations

This page is not intended to provide all the information that you will need to be able to work safely with Saft batteries, but only to help facilitate site-specific guidance in accordance with local regulations.
If there are questions around the safe handling of Saft's cells or batteries, please contact us.

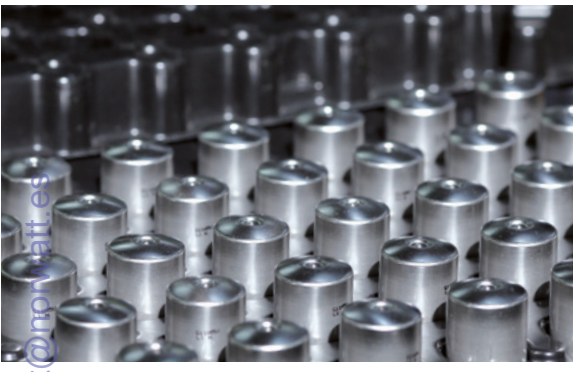
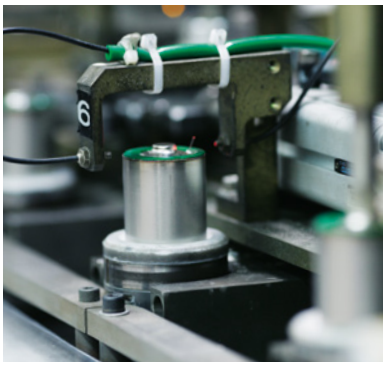
Storage

- Store batteries in a cool (preferably less than 30°C), dry and well-ventilated area.
- Keep away from moisture, source of heat, open flames.
- Keep batteries in their original packaging until use.
- Do not jumble batteries.
- Do not apply pressure that may deform the batteries.
- Appropriate fire extinguishing means should be available.
- Storage areas should be equipped with sprinklers.
- Appropriate personal protective equipment should be available (gloves, glasses, work coat...).

Handling

- Do not mix batteries of different types and brands.
- Do not mix new and used batteries.
- Do not directly heat or solder.
- Do not dismantle.
- The most frequent form of handling abuse during receiving, inspection and storage is inadvertent short-circuiting. Control measures to protect against this form of abuse should be implemented throughout the workplace. Issues associated with short-circuiting can be significantly reduced by observing the following recommendations:

- Cover all conductive work surfaces with an insulating material
- Work areas should be free of sharp objects that could puncture the insulating material
- Never disassemble a cell or battery pack or attempt to replace a blown fuse
- Conductive materials (jewelry, etc.) should not be worn by personnel handling cells and batteries
- Cells should be stored in their original packaging or by similar means
- Cells should be moved in trays using pushcarts to reduce the


probability of dropping.
- Dropped cells or batteries should be treated as a potential hot cell and must be segregated from the lot/batch
- All inspection tools should be non-conductive, or covered with a non-conductive material
- Cells should be inspected for physical damage
- Open-circuit-voltage (OCV) should be checked
- After a cell has been inspected, it should be returned to its storage packaging

Installation and replacement

- Install only new unused batteries, bearing the same date code, coming from the same manufacturer and being of the same model.
- Observe polarities during installation.
- Follow Saft's recommendations regarding maximum deliverable currents and operating temperature range.
- Only use batteries of a type that has been homologated by the device manufacturers in which they are fitted.

Disposal

- Dispose of batteries in accordance with local regulations.
- Secure terminals to prevent short-circuiting.
- Package each cell or battery in a manner that prevents shorting with the container or another cell/battery.
- Package leaking cells/batteries in a manner that contains the leak and use specific equipment to handle these products (gloves, safety glasses, appropriated working clothing, respirator, sealable plastic bags).
- Use packaging material that is in compliance with local regulations.

Specific recommendations for lithium batteries

Safety with primary lithium batteries

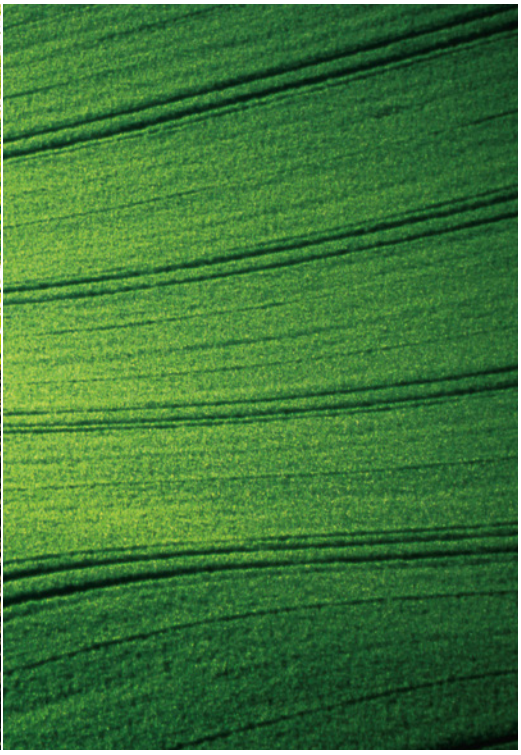
- Do not short circuit.
- Do not recharge.
- Do not puncture.
- Do not incinerate.
- Do not crush.
- Do not expose content to water.
- Do not heat above 100°C (not applicable for the LSH20-150).

Safety with lithium-ion batteries

- Never short circuit the battery terminals.
- Do not open the battery.
- Do not reverse the polarity.
- Do not overcharge or overdischarge.
- Always comply with the voltage range given on the battery label.
- Do not disassemble the battery.
- Do not use the battery without its electronic management system.
- Do not subject the battery to excessive mechanical stresses.
- Do not expose the battery to water or condensation.
- Do not place the battery on or near fires, or other high temperature locations. Doing so may cause the battery to overheat or ignite. Using the battery in this manner may also result in a loss of performance and a shortened life expectancy.
- Immediately disconnect the battery if, during operation, battery emits an unusual smell, feels hot, changes shape, or appears abnormal in any other way. Contact Saft if any of these problems are observed.

Saft is committed to the highest standards of environmental stewardship

As part of its environmental commitment, Saft gives priority to recycled raw materials over virgin raw materials, reduces its plants' air and water releases year after year, minimizes water usage, reduces fossil energy consumption and associated CO_2 emissions, and ensures that its customers have recycling solutions for their spent batteries.
Regarding industrial batteries, Saft has had partnerships for many years with collection companies in most EU countries, in North America and in other countries. This collection network receives and dispatches our customers' batteries at the end of their lives to fully approved recycling facilities, in compliance with the laws governing trans-boundary waste shipments.
Saft has selected a recycling process for industrial lithium-ion cells with very high recycling efficiency. A list of our current collection points is available on our web site. In other countries, Saft assists users of its batteries in finding environmentally sound recycling solutions. Please contact your sales representative for further information.



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