

Jauch

Company Presentation

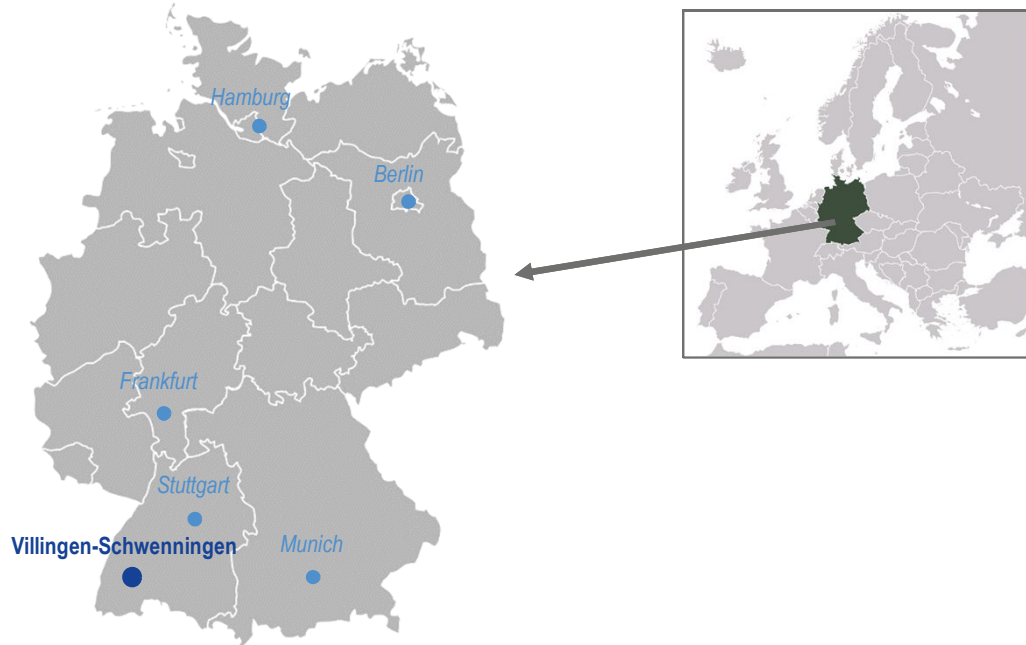
Jauch Quartz GmbH



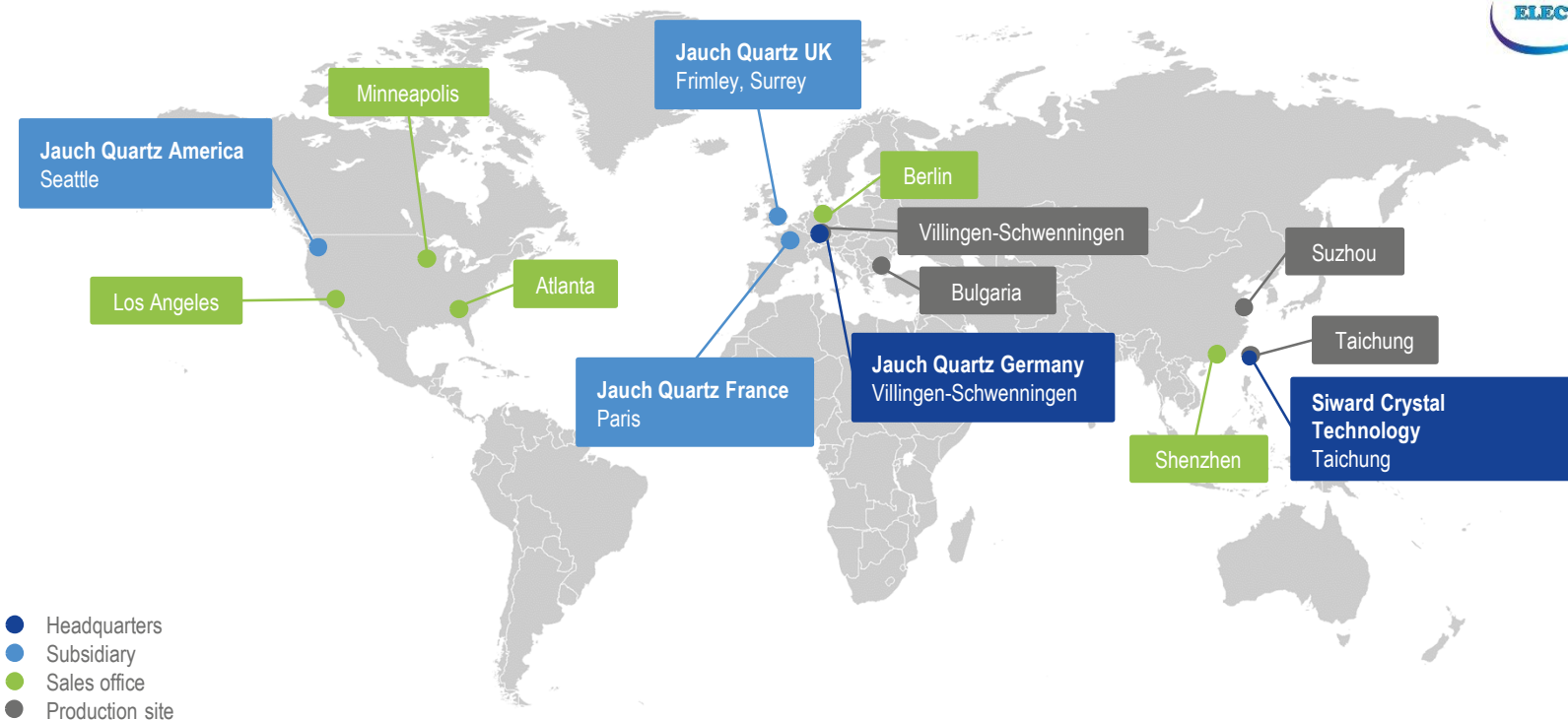
JAUCH – HEADQUARTERS



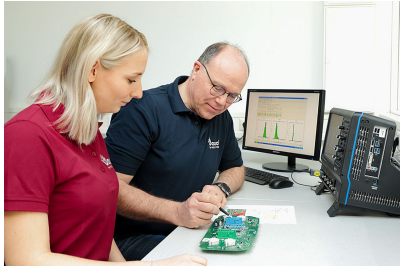
The Jauch Headquarters are located in Villingen-Schwenningen, Germany, at the edge of the Black Forest, 100 km south of Stuttgart and 40 km north-west of Lake Constance.





JAUCH – LOCATIONS WORLDWIDE

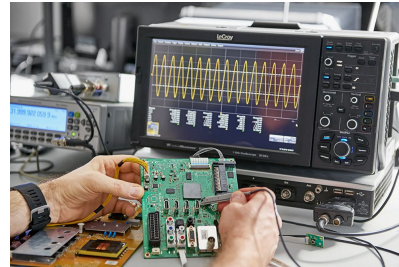


OUR VALUE PROPOSITIONS




Technical and project support

-  Frequency Control Products
-  Battery Technology





Quality "Made in Germany"

-  Frequency Control Products
-  Battery Technology





International and reliable
logistics services

-  Frequency Control Products
-  Battery Technology



Qualified specialists

-  Frequency Control Products
-  Battery Technology

MILESTONES

1954

Foundation of Jauch and start of selling mechanical components to the German watch industry



1976

Jauch becomes a representative of Renata AG - the beginning of battery sales at Jauch.

1993

Opening of a technology center for high-precision quartz crystals in Villingen-Schwenningen, Germany

Opening of Jauch Quartz Indonesia (P.T. Great)



2003

Intensive development of the battery division. Business relations and partnerships in Asia are established.



1974

Jauch is responsible for the sales of Motorola Inc.'s quartz crystals and starts selling frequency components for the first time.



1986

First cooperations with production partners in Asia



2002

Foundation of the subsidiary Jauch Quartz America, Inc.

2004

Foundation of the subsidiary Jauch Quartz France SASU

Establishment of a test center for cells and batteries in Villingen-Schwenningen



MILESTONES

2007

Foundation of the subsidiary
Jauch Quartz UK, Ltd.

Sales of the first, customer
specific, Lithium ion and Lithium
polymer battery packs



2012

Establishment of an
assembly line for batteries in
Villingen-Schwenningen



2016

Opening of a configuration
center for MEMS
oscillators in Villingen-
Schwenningen



2018

Acquisition of company "Batteries and
Power Solutions GmbH" and foundation
of "Jauch Battery Solutions GmbH"

Cooperation with Siward for joint
development, qualification and production
of frequency control products

2020

Expansion of the seminar offer
in the field of FCP technology.
Re-naming to "Jauch Academy".



2010

Partnership with Siward
for the production of
frequency components on
reserved production lines

2015

Opening of a competence
center for battery
management systems in
Villingen-Schwenningen.



2017

Expansion of our own test laboratory
in Villingen-Schwenningen to authorize
UN certifications for batteries.



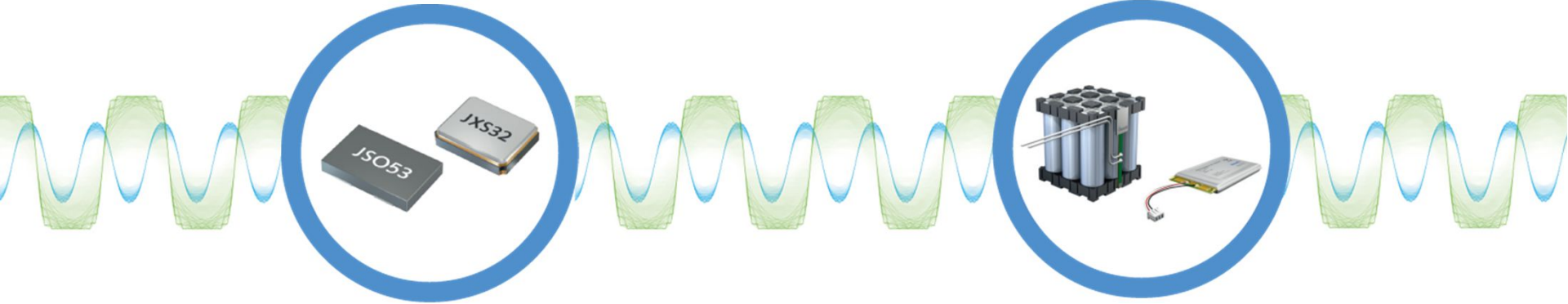
2019

Opening of the Jauch Battery
Academy in Villingen-Schwenningen

Launch of battery brand "Jauch".



PRODUCT RANGES



Frequency Control Products

Quartz Crystals
Crystal Oscillators

Battery Technology

Battery Packs
Lithium Ion and Lithium Polymer Batteries
Battery Management Systems (BMS)
Certifications
Battery Academy

PRODUCT TIMELINE QUARTZ CRYSTALS



SMD – Glass Seal
JXG-Series



SMD – Seam Seal
JXS-Series



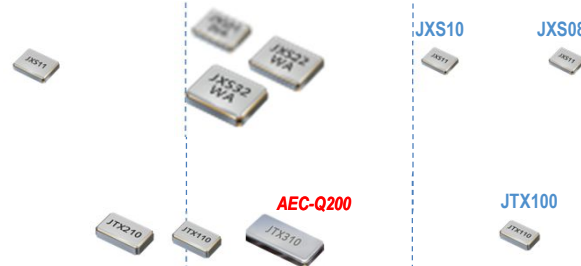
SMD – Tuning Fork
JXT-Series
SMQ-Series



SMD – Full Metal
SMU-Series
MQ-Series
HC49/U



for wireless applications



2000

2005

2010

2015

2020

2025

PRODUCT TIMELINE OSCILLATORS



XO (H)CMOS
JO-Series

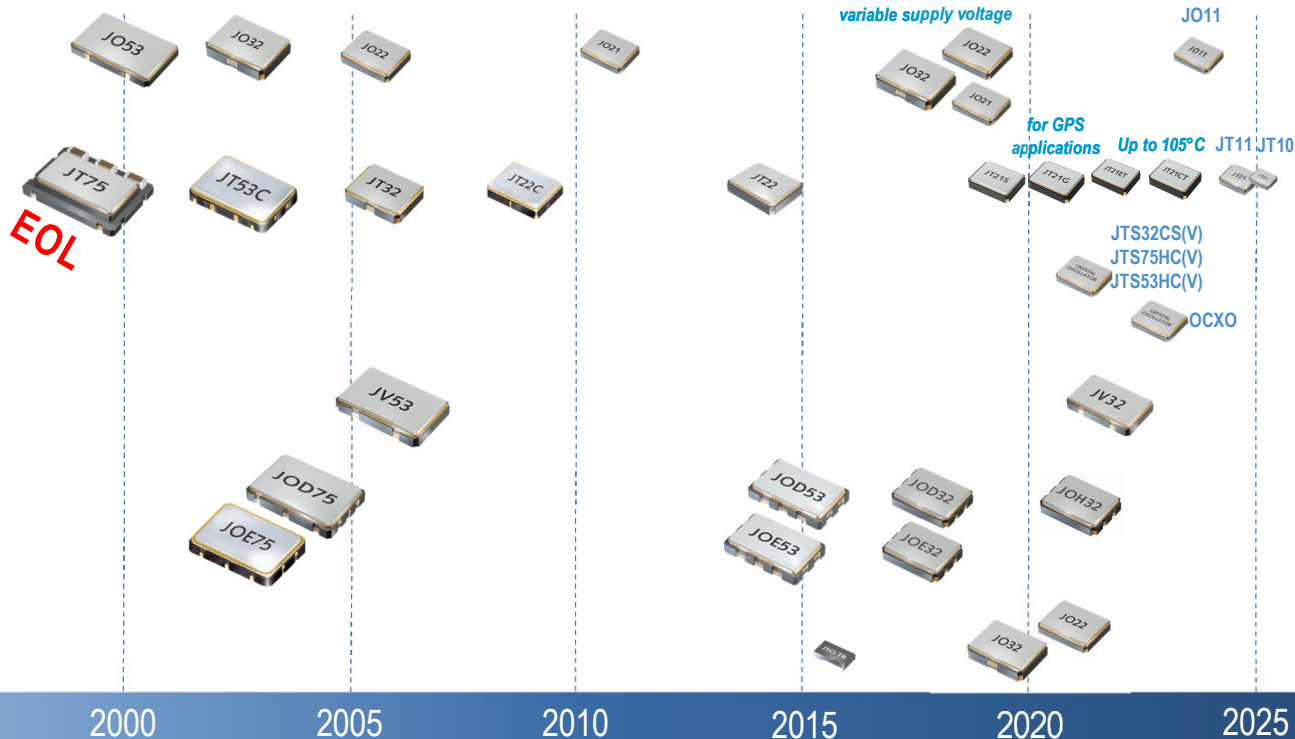
**(VC)TCXO Clipped Sine /
TCXO HCMOS**
JT-Series

Stratum 3
(VC)TCXO
OCXO

VCXO HCMOS
JV-Series






XO PECL, LVDS, HCSL
JOD-Series
JOE-Series
JOH-Series

XO 32.768kHz








PRODUCT OVERVIEW – QUARTZ SERIES



Quartz Series	Package	Frequency Tolerance	Frequency Stability	Dimension
JXS standard		±10 ppm	±10 ppm	from 1210 to 5032
JXS-WA for wireless applications		±10 ppm	±10 ppm	from 2016 to 3225
SMU		±20 ppm	±20 ppm	from 1148 to 1350
JTX		±20 ppm	-80 ppm (-20°C/+70°C) -160 ppm (-40°C/+85°C)	from 1610 to 3205
SMQ32SL tuning fork		±20 ppm	-80 ppm (-20°C/+70°C) -160 ppm (-40°C/+85°C)	8038
Temperature ranges up to -40°C to +125°C				

PRODUCT OVERVIEW – QUARTZ SERIES



Oscillator Series	Package	Frequency Stability	Dimension
JO standard XO (CMOS output)		$\pm 8 \sim \pm 25$ ppm	from 2520 to 7050
JO XO 32,768 kHz (CMOS output)		± 25 ppm	from 2520 to 3225
JT (VC)TCXO (clipped sine / CMOS output)		$\pm 1 \sim \pm 2,5$ ppm	from 2016 to 5032
JV VCXO (CMOS output)		± 25 ppm	from 5032 to 7550
Temperature ranges up to -40°C to +105°C			
JOD/JOE/JOH XO ((LV)PECL/LVDS/HCSL output)		± 25 ppm	from 3225 to 7552
	Excellent phase noise (for option IP)		

CONSULTATION

Jauch specialists will advise and assist you before and during the development phase in detail.

- **Selection of suitable components**
Avoid incorrect decisions, minimize development problems, optimize lead times, optimize costs
- **Help with specifications:**
Joint creation of custom specifications for your project, selection of products according to your requirements, individual precalculation
- **Technical support along with distribution:**
Precalculation for special applications, optimized specification with regards to all project-specific parameters, cost-optimized preselection



DESIGN-IN-SUPPORT

Jauch has a modern electronic laboratory, so we can optimally support you in developing your circuits.

- **Sizing assistance for quartz circuits:**
Product selection based on electrical aspects, sizing recommendations based on your IC datasheets, consultancy for special applications, checking your prototypes in our laboratory
- **Modification recommendations for quartz circuits:**
Qualified modification proposals based on our circuit analysis, correction of the component selection, correction after layout change



APPLICATION SAFETY

We validate your oscillator circuit with special testing equipment in terms of amplification margin and oscillation start up safety.

- **Oscillation safety investigation:**

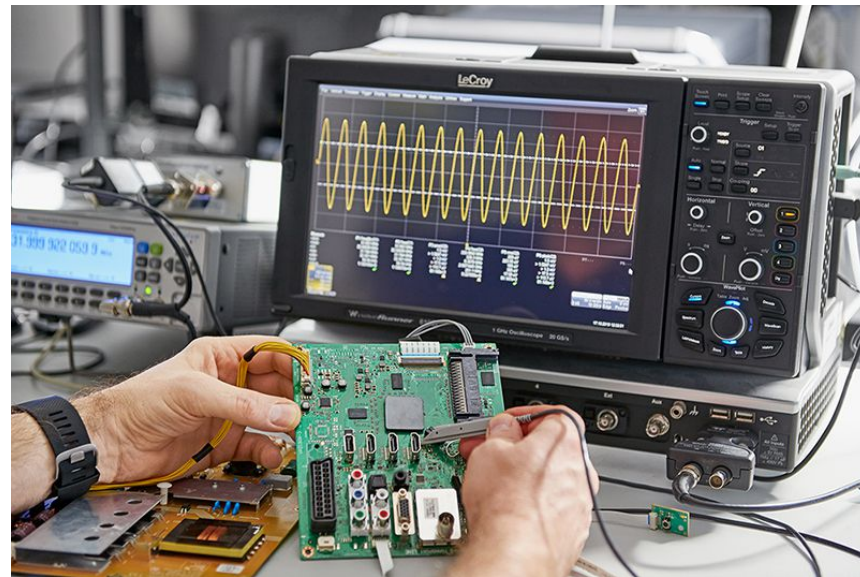
Determination of the resonance frequency, measurement of electrical parameters, determination of the oscillation start up safety, checking compliance with specification list (optimization of lifetime expectancy)

- **Load capacity adjustment:**

Optimization of the resonance frequency, optimization of oscillation safety, optimization of quartz crystal power

- **Determination of quartz crystals performance:**

Measuring the quartz crystal current with the help of current probe, calculation of crystal power (drive level) with regards to predetermined specification



SUPPORT FOR APPLICATION PROBLEMS

We can help in solving problems in your circuit.

- **Determining the electrical quartz crystal parameters:**
Measurement of electrical parameters of the quartz crystal at +25°C,
optimal design of the circuit (performance, load capacitance, ...),
correction of specifications, optimizing the design selection
- **Determining the electrical oscillator parameters:**
Measurement of all electrical parameters of the crystal circuit in the
customer's application at +25°C, measurement under simulated climatic
conditions, sized patterns/designs for pilot series and prototypes
- **Measurement of temperature coefficient:**
Measuring the behavior of quartz crystals and oscillators in our
temperature chambers



PRODUCT PORTFOLIO BATTERIES



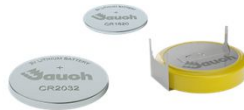
Lithium Ion Batteries



Lithium Polymer Batteries



Lithium Thionyl Chloride Batteries



Lithium Button Cells



Cylindrical Lithium Batteries



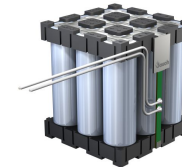
Lithium Iron Phosphate Batteries



NiMH Batteries



Battery Holders

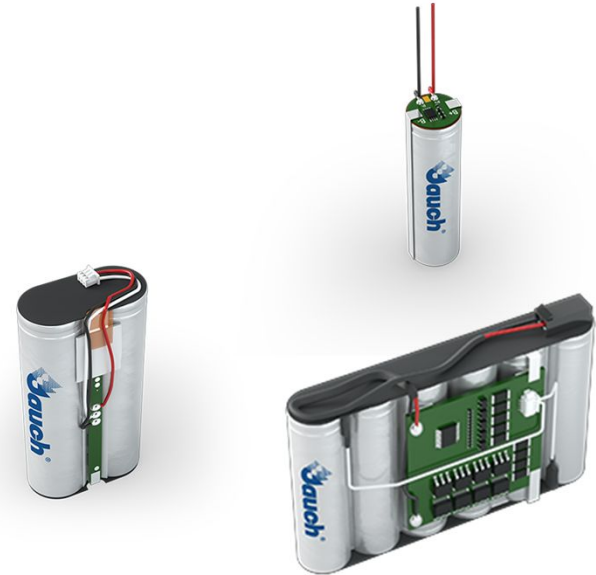


Individual Solutions

LITHIUM ION BATTERIES



- Wide range of cylindrical and prismatic cells
- Graphite electrode (negative) and lithium metal oxide electrode (positive)
- Lithium metal oxide can be manganese, nickel or cobalt.
- Nominal voltage depends on the electrode material and is 3.6 or 3.7 volts.
- Charge voltage is usually 4.2 volts.
- Cell voltage, temperature sensitivity, maximum allowable charge or discharge current vary greatly depending on electrode material and electrolyte.
- High energy density



LITHIUM POLYMER BATTERIES

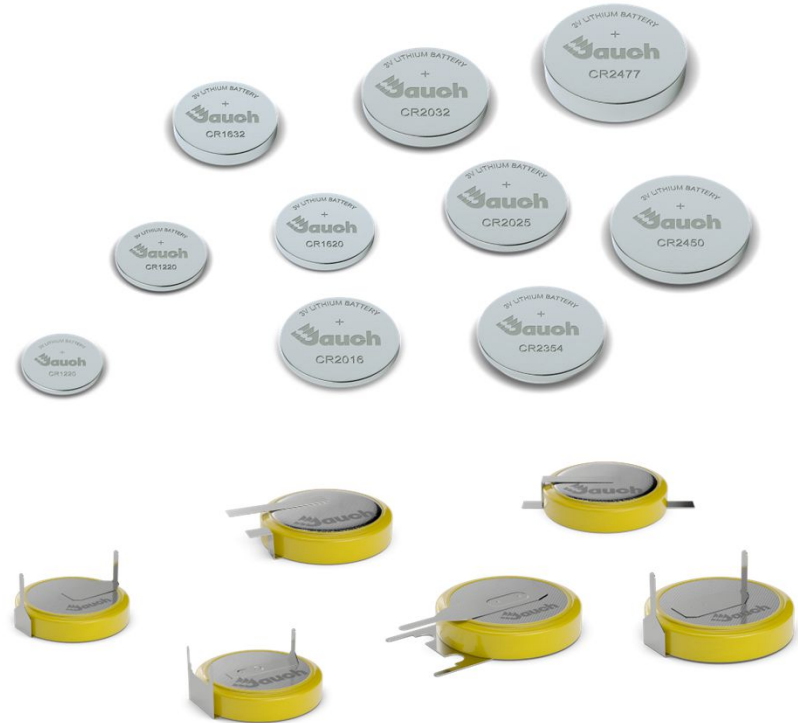
- Wide range of different sizes, mostly pouch cells
- Plastic-coated aluminum foil is used instead of a steel housing.
- Cells can be very thin and are lighter than other battery types.
- Nominal voltage depends on the electrode material and is normally 3.7 volts.
- Charge voltage is usually 4.2 volts.
- Because of the soft housing, the thickness of the cell can increase during the charging process („swelling“). This phenomenon must be considered in the planning of the housing.



LITHIUM BUTTON CELLS



- Large selection of sizes
- Different pin configurations available
- Main application areas: car keys, watches, medical equipment, LED flashlights, and any form of memory backup
- Nominal voltage is 3 volts.
- Fast delivery times (stock article)
- Wide temperature range from -30 to +70°C



CYLINDRICAL LITHIUM BATTERIES

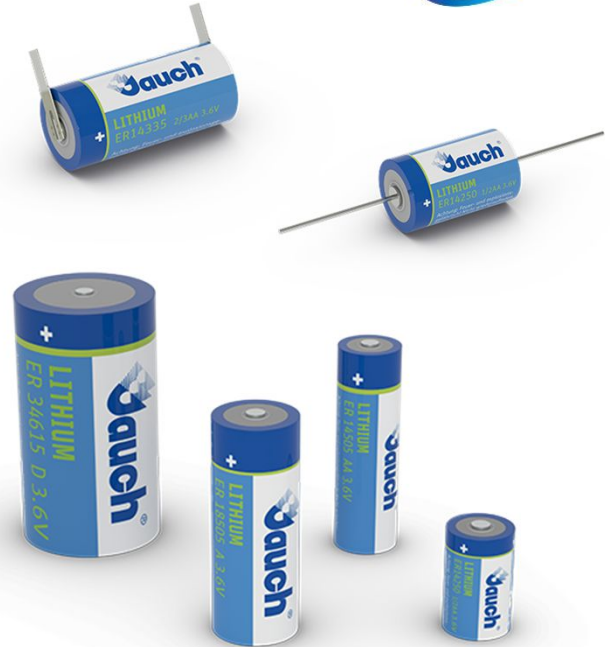
- Low self-discharge, long shelf life
- Non-rechargeable
- Lithium manganese dioxide batteries (LiMnO_2) with a voltage of 3 volts are widely used.
- Mainly used in electronic devices and as a backup battery for motherboards
- Low passivation of the anode helps avoid voltage drops at the beginning of the load (voltage delay).
- Lithium carbon fluoride mono cells ($\text{Li}(\text{CF})_n$) are also widely used.
- Further increased durability and extended temperature range with a lower self-discharge
- Mainly used in the field of memory backup



LITHIUM THIONYL CHLORIDE BATTERIES



- Non-rechargeable lithium battery with lithium as an anode and a graphite electrode as a cathode
- Thionyl chloride serves as both a solvent and an electrolyte.
- Nominal voltage is about 3.6 volts, which remains nearly constant during the discharge time.
- Highest energy density of all primary batteries, up to 650 Wh/kg
- Maximum reliability even at high power consumption and in extreme temperature conditions (-55 to +85°C)
- Wide range of sizes, round cells and prismatic cells
- Different tab configurations available
- Typical applications: off-grid power supply of electronics in military and industrial applications, security technology, and utility meters



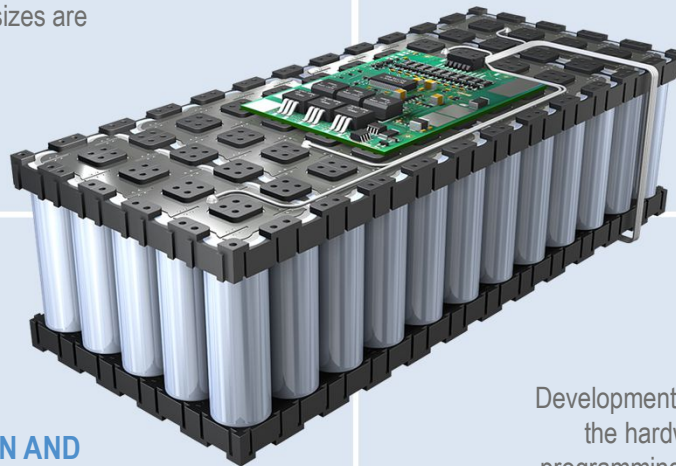
PACK DESIGN

CELL SELECTION

Large selection of standard cell sizes and chemistries. Individual cell sizes are possible.

DEVELOPMENT

Development of a battery pack that is ideal for your application.



PRODUCTION AND ASSEMBLY

Prototypes, small and large volumes.

ELECTRONICS

Development and production of the hardware and software programming for the protection circuits and battery management systems.

BATTERY PACKS DEVELOPMENT AND KNOW-HOW



Even with complex battery pack configurations for your customers, you can rely on the competent support of Jauch. Our own research and development team includes doctors of chemistry, production technicians, electronics engineers as well as certification and transportation specialists.

The large number of battery tests required on the market can be carried out at Jauch's own test laboratory in Villingen-Schwenningen.

Battery Development Process:



INDIVIDUAL SOLUTIONS & CUSTOMIZED DEVELOPMENTS

We develop individual battery packs for our customers.

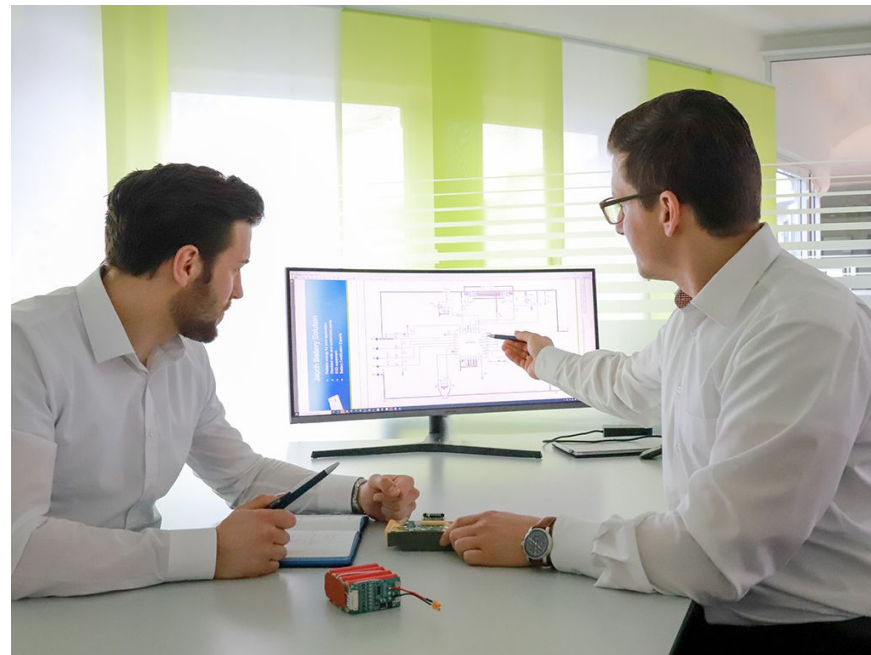
- Taking care of special requests for design-in as well as all relevant safety aspects
- Individual package design with all the technical specifications will be accompanied by extensive testing and studies.
- Development of the software for the battery management system which ensures that the battery pack operates safely even under extreme loads.



CONSULTATION & DESIGN-IN

In-depth support by our battery experts.

- We support our customers right from the design-in phase.
- Together with the customer we develop an optimized solution for every application and every device.
- Customized cell sizes are developed and produced in order to realize the best solution.
- The housing of the battery is configured in accordance with individual requirements of the customer.
- Customer-specific developments are accompanied by extensive tests and a feasibility analysis.
- Consultation on handling, transport, storage and certification of batteries



CELL SELECTION

We select the ideal cell for the customer's application.

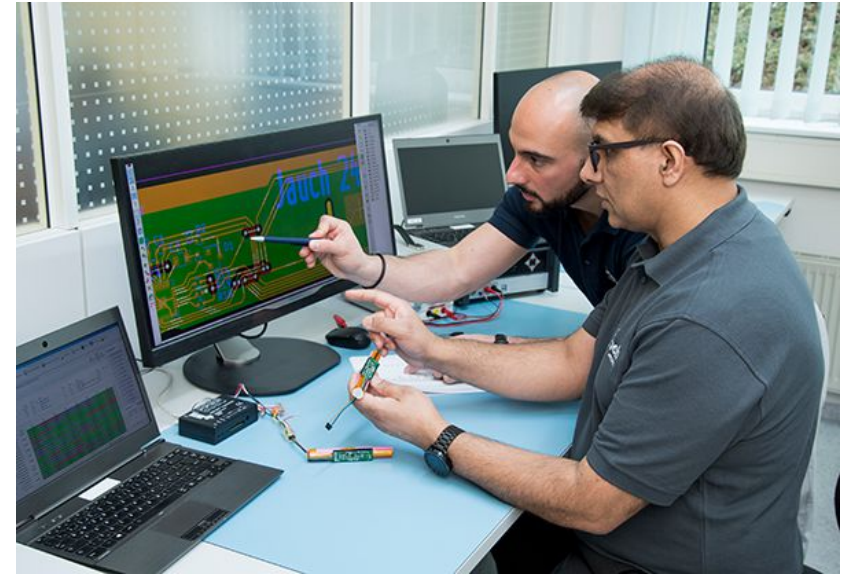
- Wide range of cell sizes
- Wide range of cell chemistries



ELECTRONICS (PCM & BMS)

Protection Circuit Module and Battery Management System

- Development and production of the hardware as well as programming of the software for the protection circuits and battery management systems
- From simple electronic protection circuits to intelligent batteries with programmable battery management systems
- Battery management system will be tailored to the characteristics of each battery pack and matches the requirements of the application.



CERTIFICATION

We support in certification questions.

- Own Jauch test and certification laboratory
→ flexible in conducting battery tests
- UN38.3 certifications can be authorized in Villingen-Schwenningen
- All international certifications with accredited partner laboratories (UL, IEC, PSE, KC, EMV, ...)
- All certification criteria must be observed from the outset



TEST CENTER

Our test center for batteries and cells in Villingen-Schwenningen was established in 2004 and expanded in 2017.

- CTF für IEC IEC62133-2:2017
- UN38.3 Transport Test
- Customer-specific tests: simulation of extreme environmental or temperature conditions
- Benchmark tests
- Functional tests
- Vibration, shock and drop tests
- Determination of the required current profile
- Charging and discharging tests
- Safety tests



TRANSPORTATION

We are experts for the transport of batteries.

- Jauch employees are trained for the shipment of dangerous goods and IATA certified: consignor (PK 1) and packer (PK 2)
- Expertise in the packaging and labelling of lithium batteries
- Support in transportation of lithium batteries by road, sea, and air, in compliance with transport regulations
- Required accompanying documents for the transport of batteries



INDUSTRIES

- Industrial Electronics
- Medical Technology
- Measurement and Control Technology
- Safety Engineering
- Automotive
- Tooling Equipment
- Military and Defense
- E-Mobility
- Smart Metering
- Communication Technology



FACTS & FIGURES



Group Sales Volume 2021:

EUR 52.5 million



Employees @Jauch Group:

143

Employees @Cooperation Partners:

1,100



Certificates Jauch:

ISO 9001:2015

Certificates Production Partners:

IATF 16949

ISO 14001

IECQ Q080000

ISO 45001 / OHSAS 18001

ISO 13485



Active End Customers:





> 5,000

FACTS & FIGURES – FCP

Production locations

Germany:	quartz crystals
Taiwan:	quartz crystals, quartz oscillators
China:	quartz crystals

Production capacity

 kHz crystals:	15,000,000 per month
 MHz crystals:	100,000,000 per month
 XO / VCXO:	10,000,000 per month
 TCXO:	3,000,000 per month

Warehouse

Capacity:	90 million pcs
Products in stock:	60 million pcs

FACTS & FIGURES – BATTERY



Production locations

Germany:	Battery packs
Bulgaria:	Battery packs
China:	cells



Production capacity – cells

 CR:	64,000,000 per month
 ER:	11,000,000 per month
 LP:	4,000,000 per month
 LI:	20,000,000 per month



Production capacity – packs

Germany:	3,000 per month
Bulgaria:	20,000 per month
China:	300,000 per month



Warehouse

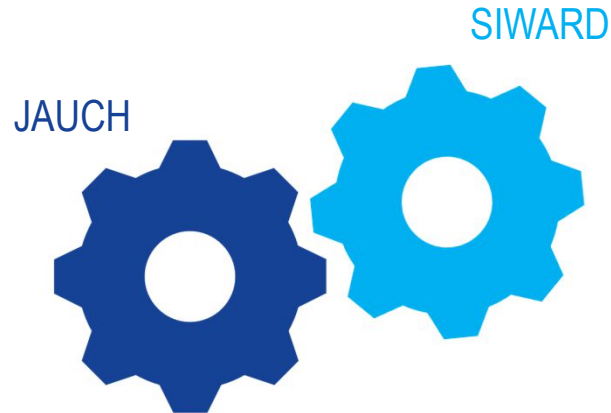
Capacity:	10 million pcs
Products in stock:	6 million pcs

COOPERATION JAUCH + SIWARD



In December 2018, the long-standing cooperation between Jauch and Siward reached a new level.

- Joint development
- Joint production
- Joint component qualification
- Experience and education in the areas of development, production and QA
- Sharing of state-of-the-art, fully integrated in-line production systems
- Similar corporate culture

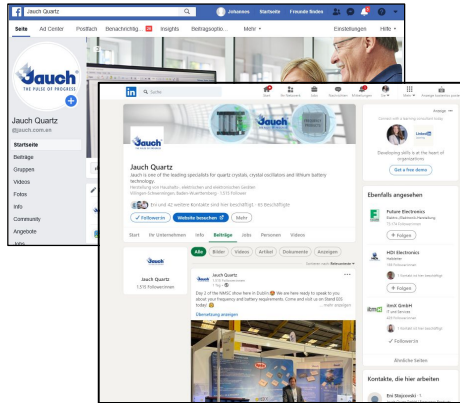


STAY INFORMED

On our social media channels, blog and website you will stay up to date with all Jauch news!

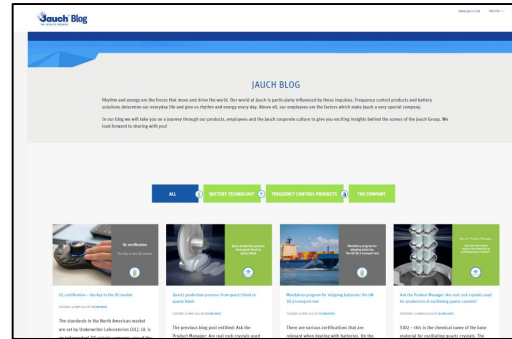


Social Media



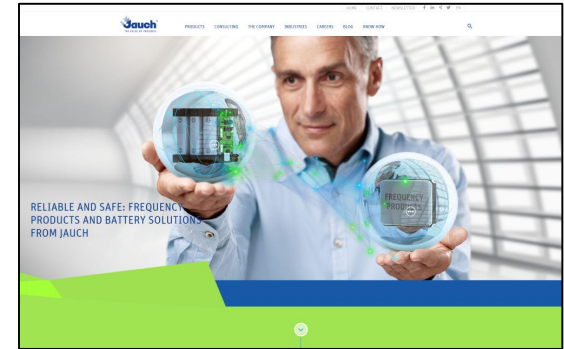
- Jauch Quartz / Jauch Quartz Deutschland
- Jauch Quartz / Jauch Quartz Deutschland
- Jauch Quartz
- Jauch Quartz GmbH

Blog



www.jauch.com/blog

Website



www.jauch.com

STAY INFORMED

On our social media channels, blog and website you will stay up to date with all Jauch news!

Social Media:

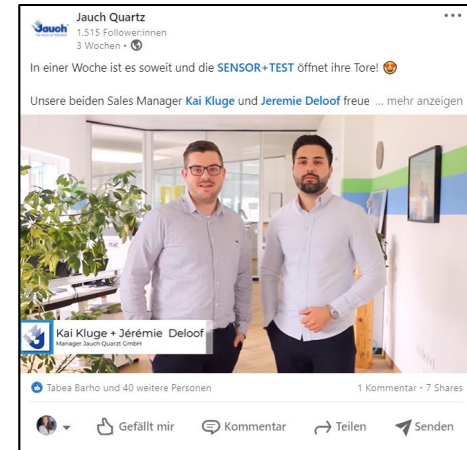
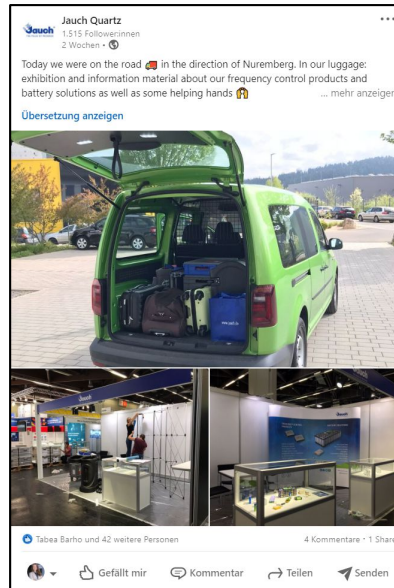
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-  Jauch Quartz → linkedin.com/company/jauch-com
-  Jauch Quartz → twitter.com/jauch_en

Blog:

www.jauch.com/blog/en

Jauch Website:

www.jauch.com



THE PULSE OF PROGRESS





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