



The Way to a Mobile Future

Temperature and Climate Test Systems for Lithium-Ion Batteries

Energy for a mobile future...

New ways to mobile energy supply...

Mobile energy supply has long since become standard and even indispensable in many areas.

Whether we are talking about mobile phones, laptops or the world of digital cameras, where would design and function be without the internal workings of energy storage systems?

Given the fact that there is only a limited supply of fossil energy sources, it is becoming increasingly important to use new techniques such as hybrid vehicles for mobility on the road.

Latest developments showcase hybrids as a combination of an internal combustion engine as the main energy source and an electrical machine with a storage medium in the form of a battery, fuel cell or SuperCups.

Cars driven solely with electricity will most likely be the next step in automobile development.

Existing systems mostly use nickel-metal hydride batteries, although lithium-ion batteries have long since become the standard for mobile phones and notebooks.

The lithium-ion battery is also a source of energy on track for the future for hybrid drive due to its high cell voltage, power and energy density. They have the advantage of thermal stability, a constant level of voltage over the discharge period and the fact that it knows no memory effect.

But safety for customers and the environment is also at the top of the agenda for this future generation of cars. This is the reason why there have been mandatory safety standards for lithium-ion batteries since 2003.

We believe these new techniques should offer the highest level of safety and all design efforts should be aimed at ruling out any and all hazards.

Engineers and designers from Weiss Umwelttechnik have put their heads together with the key developers in the automobile industry to develop test systems. The idea is to test these new technologies under conditions as close to reality as possible to meet the challenges for a safe future.

The safety equipment on these test systems keep risks to a minimum when testing intentionally passes the limits of normal use.

Identifying risks ...

- chemical reactions
- thermal charges
- reactions to overcharge
- reactions to fast charge
- reactions to damage
- mechanical/dynamic charges



...reliable and safe

...need matching test systems

An energy storage system has to be as safe as possible. External charges such as very high or low temperatures, fast temperature changes, humidity, mechanical charges or corrosion factors should not cause them to fail or bring about undesired effects.

We develop and build state-of-the-art systems for these special requirements applying next-generation design ideas.

Our temperature and climate test chambers make it possible to cover an extensive range of safety tests with the right add-on equipment tailor-made to your testing needs.

Each test system is built together with you according to your test requirements and can be integrated to a complete test system.

We want to do our bit to make sure that it will be possible to safely use the technical solutions of today in the near future.



Weiss Umwelttechnik GmbH is one of the foremost manufacturers of standard testing systems and special environmental simulation testing units anywhere in the world. Our range of products includes systems for temperature tests, simulated exposure to weather, temperature shock and corrosion tests in all test chamber sizes for research, development, quality control and production.

Our high-performance after-sales service guarantees optimum customer service coupled with a high level of operational reliability for systems.

Decades of experience in a wide variety of applications while maintaining exhaustive communication with our customers all over the world are emblematic for an excellent working relationship.



10 steps to optimum safety...

Avoiding risks in testing...

Weiss not only has extensive series production safety equipment as standard test units. Special add-on components can be supplemented for testing lithium-ion batteries tailored to the different hazard levels (0 ... 7).

A comprehensive safety strategy guarantees that these systems are run at a low level of risk.



- Additional STB safety temperature limiters to limit the maximum test chamber temperature at a very high level of reliability even if the test cabinet is malfunctioning.
- Forced cooling for the system to +20 °C with a test bed guard provided by the customer with a potential-free contact
- Compressed air purging at 10 x the ventilation rate
- Monitoring the test chamber for CO₂ rise to identify leaks in overloaded cells
- Monitoring the test chamber for H₂ rise to identify leaks in overloaded cells
- CO₂ flooding equipment with CO detection
- N₂ inerting without measuring O₂
- N₂ inerting while measuring O₂
- Pressure relief for the test chamber with tested rupture membrane, a reinforced test chamber and additional door interlocks
- Electromechanical door lock

...based on temperature and climate systems

Temperature and climate test chambers



- + CO₂ cooling and inerting
- + H₂ concentration measurement
- + CO₂ concentration measurement
- + CO concentration measurement
- + Safety temperature limiter

Temperature test chambers



- + CO₂ cooling and inerting with quick-release valve (manual/magnetic valve)
- + CO concentration measurement

Stress Screening test chambers



- + Heavy-duty floor to 500 kg
- + H₂ concentration measurement
- + CO concentration measurement
- + N₂ inerting instrument
- + Overpressure rupture plate

A wide selection of basic systems...

Emission test chambers



- + H₂ concentration measurement
- + CO₂ concentration measurement

Vibration test chambers



- + CO₂ inert gas purging
- + H₂ concentration measurement
- + CO concentration measurement

Temperature shock test chambers



- + CO₂ inert gas purging
- + H₂ concentration measurement
- + CO₂ concentration measurement
- + CO concentration measurement

Walk-in temperature and climate test chambers



- + H₂ concentration measurement
- + CO₂ concentration measurement
- + Fire extinguisher on-site

...with state-of-the-art communication

Control and regulation with the SIMPAC* computer system

The 12" TFT-colour touch screen display and the Windows software package SIMCONTROL* are iconic for maximum operating convenience. Simulation programs and test findings are stored on the hard disc and can be exchanged via Ethernet or USB stick (optional).

The 32-bit I/O SIMPAC* system does all the controlling and regulating while target and actual values are shown as graphs.

These systems have an on-line service function meaning you can use the remote control and monitoring to access them via network on the web server or via internet from outside when authorised.



12" TFT-colour touch screen display

Controlled environmental conditions with SIMPATI*

Evaluating and documenting test cycles including the customer's special measuring data guarantee a higher quality standard.

SIMPATI* links as many as 99 testing systems to one PC to guarantee all chamber configuration parameters are archived.

SIMPATI* integrates itself into your PC network to enable you to operate other PCs with your Internet browser without requiring special software.

You not only can generate the normal messages on the screen and input into the report file, you can also generate emails for transmitting to different recipients. For instance, you can send these email messages to the PC in your office, a control room or mobile phone. SIMPATI* uses an available mail server and supports SMTP.

You can find more information in our SIMPATI* prospect.



Test systems for professionals. Test the best...



A complete product range for temperature and climate testing is available, with test space volumes of approx. 34 litres to 2160 litres and working ranges of $-75 \dots +180 \text{ }^\circ\text{C}$ and $10 \dots 98 \text{ \% r. h.}$

In addition, we also offer an extensive selection of proven test systems for simulating exposure to weather, temperature shock, corrosion and long-term testing for research, development, quality assurance and production.

As one of the leading manufacturers of simulation systems worldwide, Weiss Umwelttechnik offers the entire range of high-quality test equipment: from economical series devices to walk-in systems process-integrated systems built to customer specification.

A high-performance after-sales service ensures the optimal support for our customers and high operational safety of the systems. Decades of experience in the various fields of application and an intensive exchange of information with our customers throughout the world all serve to guarantee good co-operation.

If you value know-how, service and all-round safety, ask Weiss Umwelttechnik.

Further information, technical field offices in Germany, subsidiaries and agencies worldwide can be found at

www.weiss.info



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