



## A DECADE-LONG PARTNERSHIP POWERING INNOVATION IN ENERGY STORAGE SOLUTIONS

For more than a decade, Delta-Q Technologies has looked to Discover Battery (Discover) as a strategic partner. Both companies are market leaders in the North American motive space, with a collaboration spanning over 15 years. Discover was first to market with a clean, non-spill maintenance-free battery technology, while Delta-Q was the first to introduce high-frequency charger technology in North America. Both organizations recognized the additional benefits of moving beyond general battery and charger compatibility to focus on performance optimization. Together, they have helped power a range of industrial equipment and electric vehicles. Delta-Q brings the technical charging expertise that enables Discover to:

- Efficiently charge and keep its solutions running,
- Deliver customer value, and
- Create innovation within traditional industries to help speed the adoption of new technologies.

## DISCOVER BATTERY

Discover is a global leader in designing and manufacturing advanced energy storage solutions for transportation and motive power. Founded in 1949 as a battery distribution business, the organization has since become a leading manufacturer of high-value power solutions that deliver and service batteries internationally.

The company measures success by delivering excellence with the design, manufacture, and supply of its energy storage solutions. These solutions – such as AGM, Gel, or lithium-ion batteries – allow Discover’s customers and partners to differentiate their products and improve operational efficiencies.

## STEADY RELIABLE PERFORMANCE

Delta-Q initially began working with Discover more than a decade ago to support its AGM charge profile development. Early in Discover’s development process, they recognized the value of working with a charger company to develop more tailored charging profiles. Sharing the same floor equipment OEM partners allowed the equipment, battery, and charger manufacturers to share inputs and innovate. As a result, Algorithm #42 and #43 were developed for Discover Dry Cell AGM batteries in Delta-Q chargers for motive equipment applications. These algorithms feature Deep Discharge Recovery to detect and combat situations where batteries have

been severely discharged, Maintenance Mode to keep batteries fresh and prevent over-discharge when stored for prolonged periods, Unique Pulse Finish to help prevent battery sulfation while avoiding heat generation, and Accurate Recharge to optimize amp-hour return rates and avoid over or undercharging batteries. Alignment in approach, reputation, and expertise, married with geographic proximity, brought the two companies together. Delta-Q continues to customize software features and charge algorithms for Discover’s AGM battery packs, including solutions created for Kärcher, a global manufacturer of floor care machines.



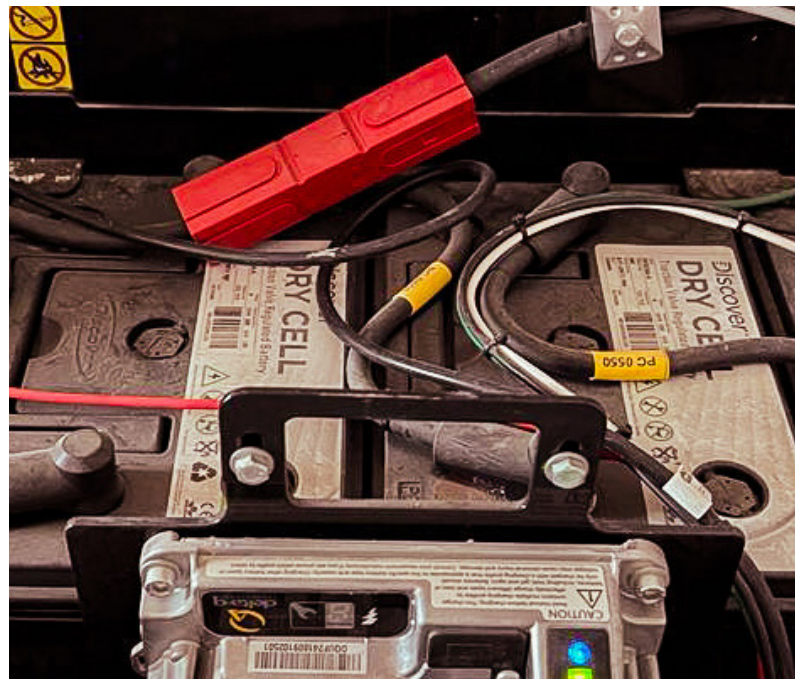
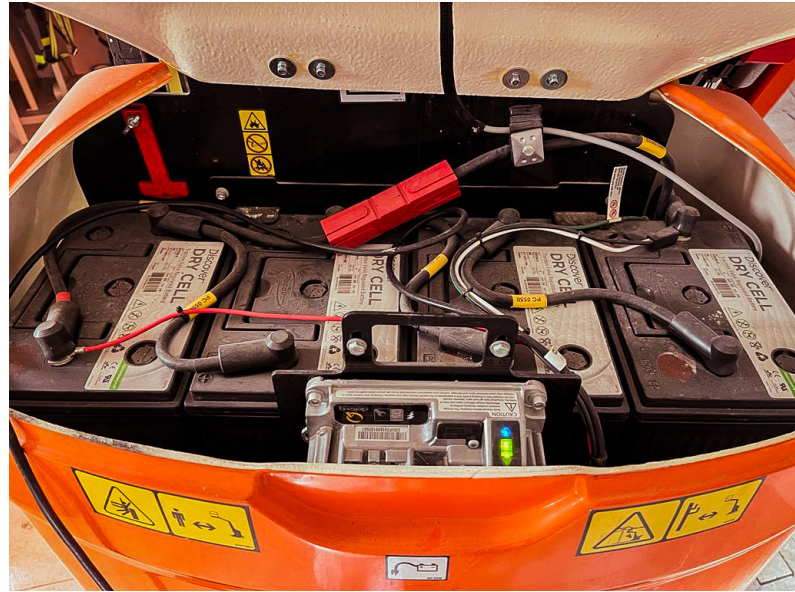
## THE MOVE TOWARDS LITHIUM-ION

Delta-Q's range of charge profiles helps Discover exceed its customers' needs, as they adapt to evolving economic and environmental changes. For example, the shift to lithium-ion continues to be a growing trend in battery and charger selection, as companies look to maximize equipment life and improve efficiency. Discover and Delta-Q's early adoption of lithium-ion solutions allows their partners to advance electrification and drive further innovation of their equipment and fleets. Kärcher has spearheaded innovation in the floor care sector by designing highly efficient and reliable battery-powered commercial cleaning equipment with lithium-ion batteries. Many of Discover's OEM

**They have a number of charge profiles and algorithms available and I've never had to ask the Delta-Q folks to develop a new charge profile – they are already on it.**

**Rex Shull**

**Vice President of Product Management and Engineering,  
Kärcher North America**



customers are in the process of transitioning to lithium-ion batteries. This progression requires Discover – and in turn Delta-Q – to provide charge profiles that support both lithium-ion and/or lead-acid batteries.

For Discover, the ability to offer its customers a high level of flexibility and variety is a competitive advantage. The ability to change between a lithium-ion and lead-acid battery, with the same charger, simplifies and improves the OEMs' and their customer's experience.

# A TURN-KEY REPLACEMENT SOLUTION TO HELP OEMS ADOPT LITHIUM BATTERY TECHNOLOGY

While some OEMs understand the benefits of lithium batteries, and that there is a progression in the adoption of this technology, there are many that are not ready to transition. To create a fully integrated and safe lithium battery and charging system, the OEM needs to source a battery and compatible charger. Communication between the components benefits the integration as it improves performance and transparency in the field while transitioning. However, due to a lack of know-how and resources available, many OEMs are slow to transition.

Discover saw an opportunity to overcome this challenge and decided to create a drop-in replacement solution to help OEMs easily transition from lead-acid to lithium. The solution consists of a lithium battery, internal BMS, charger, and display, which all communicate with each other using CAN communication network.

Discover's design ensured the charger integrated well with their solution. The timing was fortuitous as Delta-Q had just expanded its battery charging capabilities to support the Society of Automotive Engineers (SAE) J1939 standard. SAE J1939 is a preferred CAN standard for in-vehicle networks, and it helps integrate the battery charger into a vehicle system. This new capability benefitted Discover as it allows their BMS to command and control the charger.

## AES LiFePO<sub>4</sub> DYNAMIC CHARGING

### Open-loop Vs. Closed-Loop with LYNK COMMUNICATIONS

(3.4Vpc Static Charge vs. Dynamic Charge Profile)



In fact, Delta-Q is the only charger provider that natively works with Discover's batteries over their AEBus™ system.

Delta-Q and Discover's use of standard J1939 CAN protocols also help enable communication between the BMS and other parts of the equipment's system. OEMs and operators use access to battery and charger data to inform operating decisions and planning. This level of access reduces equipment maintenance requirements, improves safety, and improves equipment reliability - which ultimately increases equipment lifespan.

## CONTINUED PARTNERSHIP

Discover and Delta-Q continue to prioritize innovation and reliability to deliver the highest quality power and charging solutions to their customers. Both companies' ability to scale power offerings, while also considering customers' charging needs, has laid the groundwork for continued advancement, collaboration, and innovation across the industry.



**Through a partnership that spans over 15 years Delta-Q and Discover Battery have collaborated to deliver industry leading charging and storage solutions to our OEM partners and customers.**

**Jimmy Au**

**Vice President of Business & Product Development,  
Discover Battery**



## ABOUT DELTA -Q

Delta-Q Technologies develops and supplies battery chargers to original equipment manufacturers (OEMs) of electric vehicles and industrial equipment. Delta-Q's unique blend of engineering capability in high efficiency power electronics and embedded software design delivers innovative battery charging solutions to meet the evolving needs of its customers. With more than four million vehicles and industrial machines already using its products, Delta-Q's innovation is enabling the widespread adoption of environmentally friendly electric drive systems. Delta-Q was founded in 1999 and is a privately held company located in Vancouver, Canada.

Please visit:

[delta-q.com](http://delta-q.com)



for more information

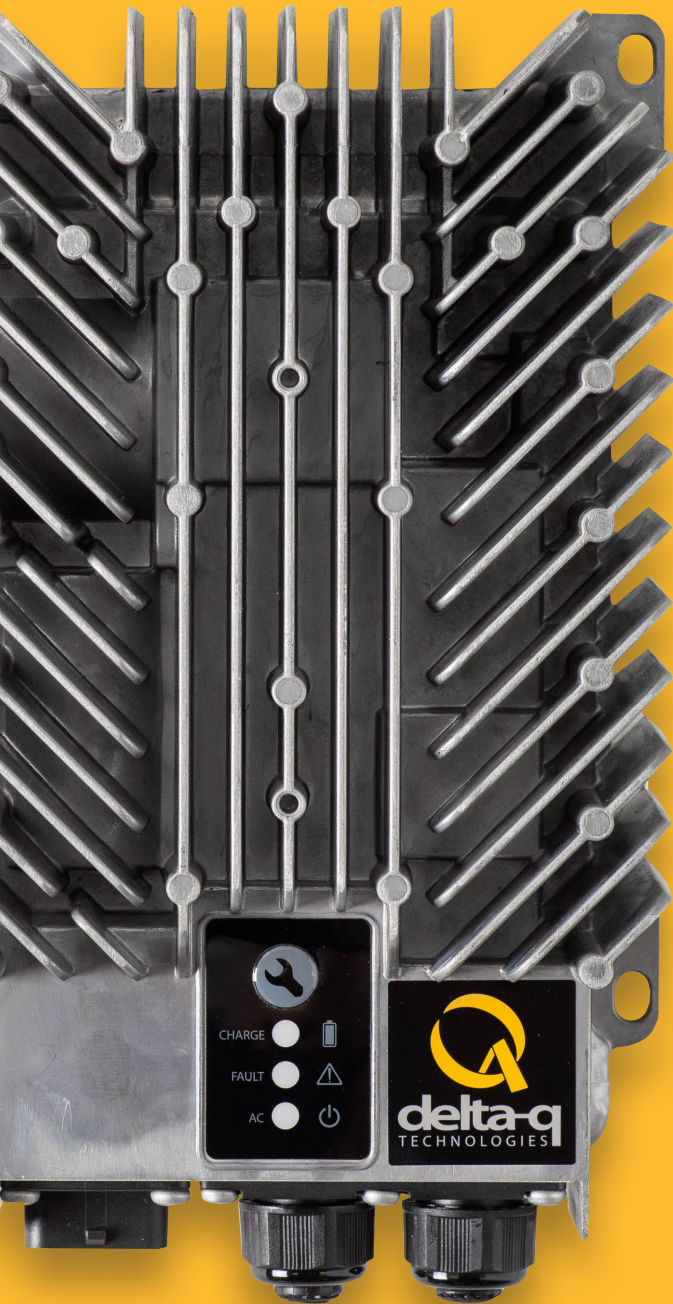
## ABOUT DISCOVER:

Discover Battery, a SOLV4EX company, leads the industry in the design, manufacturing, and distribution of leading-edge battery technologies to the transportation, motive power, and energy storage industries. Our global distribution centres ship our products anywhere our customers need them. We operate multiple manufacturing facilities that produce batteries for various applications, including renewable energy, commercial, telecom systems, mobility, and UPS/emergency lighting. With over 70 years of experience, we are leading the global power shift for a cleaner energy future.

[discoverbattery.com](http://discoverbattery.com)



for more information



## HEADQUARTERS

Delta-Q Technologies Corp.  
3577 Gilmore Way  
Burnaby, BC  
Canada  
+1 604.327.8244



@deltaqtech



@deltaqtech



linkedin.com