

Importance of getting the metering right

ProMinent has solutions in store for the battery market

There continues to be a growing demand for lithium-ion batteries and they are already shaping our everyday lives in key areas ranging from smartphones to electric vehicles. As battery usage grows, so too does the demand for optimum recycling processes as batteries contain valuable raw materials which we must reuse. This is something which will be absolutely crucial in roughly 10 to 15 years from now when the batteries in the current fleet of electric vehicles come to the end of their useful life. When manufacturing the storage material, a precise mixture must be followed and the right pH is essential. This also plays a central role in battery recycling and needs to be accurate and consistent. Metering pumps and measuring and control technology from ProMinent provide reliable production processes for this sector.

The manufacture of batteries requires energy storage solutions with a high level of energy density, good cycle stability and a long life. The most important storage materials for batteries, which satisfy these requirements, include lithium nickel manganese cobalt oxides, or NCM for short. They allow large amounts of energy to be stored and the battery capacity to increased.

Metering pumps for optimum production parameters in precursor production

In order to produce the lithium cobalt nickel manganese mixed oxide – the so-called precursor for coating the cathode foil – it is extremely important that the mixture is followed to great precision because this impacts the battery performance. Metering pumps from ProMinent provide the level of precision required as they can be used in a huge range of different fields of application and they can be controlled directly via the integrated electronics or via a BUS system. Depending on the quantities required, the durable solenoid-driven metering pumps gamma/ X (up to 45 l/h) and gamma/ XL (up to 80 l/h), which feature a rapid response time, are used to manufacture the precursor. Up to a volume of 1000 l/h, motor-driven metering pumps from the sigma family are recommended. Thanks to their patented multi-layer safety diaphragm, these ensure excellent process reliability and offer outstanding user convenience. For more viscous products or higher metering volumes of up to 65,000 l/h, ProMinent's peristaltic pumps are often used. They are self-priming and can handle outgassing media with ease. They are also easy to use thanks to their carefully designed hose replacement processes and depending on the medium, they meter with a precision of up to ± 1 %.

Obtaining a perfect pH is crucial

To get the precise mixture, the process conditions are key. Temperature management and a perfectly set pH are important to the product quality of the battery. Achieving the right pH ensures that the individual materials in a solution jointly form crystals. “The measuring and control systems and the pH sensors from ProMinent ensure that the value required is monitored accurately and adjusted via connected metering pumps if necessary. This is required if the pH is modified slightly by the reaction products. Then sodium hydroxide solution and ammonium hydroxide must be precisely and reproducibly supplied by metering pumps in order to keep the pH consistent,” explains Bekir Bayraktar, Global Director - Power & Energy and Project Business at ProMinent. Smooth processes are made possible by ProMinent’s DULCOMETER controller which uses proven technology to keep all parameters within the target range and, thanks to a clear display, is easy to operate. Depending on the quantities required, the solenoid-driven metering pump gamma/ X or motor-driven metering pumps sigma X are connected. Even in difficult conditions where there is an excess of dirt and suspended matter, the connected DULCOTEST pH sensors ensure accurate and consistent measurement and control and also display good resistance to temperature and pressure. When combined with precise pH sensors and controllers, the accuracy and high reproducibility of ProMinent pumps ensure reliable production processes. Because everything comes from the same manufacturer, all the individual components can be combined with ease and are perfectly matched.

Successive pH changes release valuable metals from used batteries

Alongside battery manufacture, there is also growing demand for optimum recycling of lithium-ion batteries. Efficient processes for this are being constantly advanced given that we need to preserve natural and critical resources, recover valuable raw materials, minimize our dependence on material imports and reduce problematic disposal. We also need to comply with statutory requirements for ever-higher recycling rates. The hydrometallurgical method is currently considered the most suitable for recycling used lithium-ion batteries. Here again, the right pH is of great importance.

In the complex recycling process, the batteries are first discharged, manually removed, shredded and the individual parts separated out. Due to chemical reactions, in which the substances are broken down through the addition of chemicals, what is known as black mass is recovered. This contains sought-after substances, such as nickel, manganese, cobalt and lithium. “In order to individually break these down in a further chemical step, it is important that the pH is controlled with precision. The pH is changed successively through the addition of appropriate

substances via metering pumps in order to break the individual metals from the production process back down into hydroxide through multiple steps,” explains Bekir Bayraktar. Again, ProMinent supplies the right solutions in the form of motor-driven metering pumps from the sigma/ X family as well as the corresponding sensors.

Key points

- Accurate compliance with the mixture is incredibly important in the production of the cathode precursor because this impacts battery performance.
- Metering pumps from ProMinent provide the level of precision required as they can be used in a wide range of different fields of application and they can be controlled directly via the integrated electronics or via a BUS system.
- For larger and more viscous products of 1000 litres or more and up to 65,000 litre volumes, ProMinent’s peristaltic pumps are often used (depending on the medium, they meter with a precision of up to ± 1 %).
- Setting and monitoring the pH value is very important in the production and recycling of lithium-ion batteries. ProMinent’s measuring and control systems make reliable production processes possible.
- A reliable combination: the accurate metering rate and outstanding reproducibility of durable ProMinent pumps coupled with ultra-precision sensors and controllers.
- All individual components come from ProMinent and are perfectly matched as a quality solution.

You can find more information here for [Metering Pumps](#), [Peristaltic Pumps](#) and [Measuring, Control and Sensor Technology](#)



Caption 1: Precise compliance with of the mixture with motor-driven metering pumps from the sigma family (up to 1000 l/h). Due to a patented multi-layer safety diaphragm, these ensure excellent process reliability and can be controlled via a BUS system.

(Photo: ProMinent).



Caption 2: Depending on the quantity required, the durable solenoid-driven metering pumps gamma/ X (up to 45 l/h) and gamma/ XL (up to 80 l/h), which feature a rapid response time, are used to manufacture the precursor.

(Photo: ProMinent).



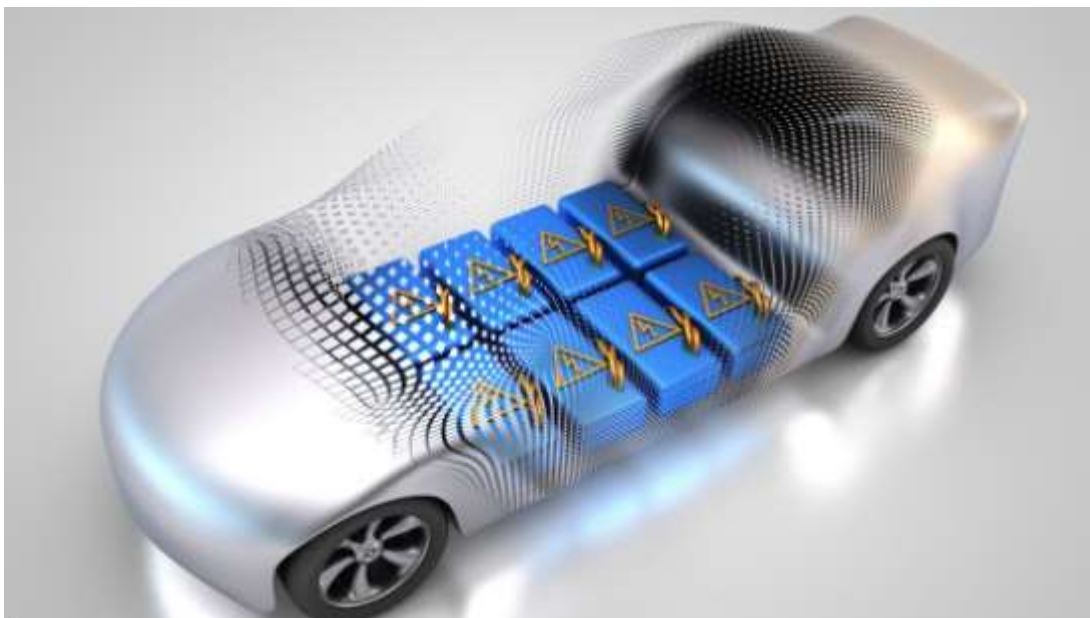
Caption 3: For more viscous products or higher metering volumes of up to 65,000 l/h, ProMinent's Dulcoflex peristaltic pumps are often used. Depending on the medium, they meter with a precision of up to ± 1 % (Photo: ProMinent).



Caption 4: By covering a large measuring range and offering good resistance to temperature and pressure, ProMinent sensors help to precisely and constantly measure pH in the production and recycling of lithium-ion batteries (Photo: ProMinent).



Caption 5: Precise compliance with the mixture is extremely important for the production of the cathode precursor: metering pumps from ProMinent provide the level of precision required (photo: Fotolia)



Caption 6: The demand for optimum recycling processes for lithium-ion batteries is growing: the right pH has a central role to play in their recycling and ProMinent can provide the right solutions for this (photo: Fotolia).

The ProMinent Group is a manufacturer of components and systems for metering technology as well as a reliable solution partner for water treatment. The Group headquarter is based in Heidelberg, Germany. More than 2,800 employees in about 50 own sales and service companies as well as 11 production sites work hard to provide individual solutions and high-quality services to ProMinent customers. More information: www.prominent.com.



ProMinent Group



ProMinent Deutschland



ProMinent Group