Device connectors for energy storage applications

PHOENIX CONTACT
INSPIRING INNOVATIONS

Solutions for the future of energy storage

For over 90 years, Phoenix Contact has been the trusted choice for OEMs supporting the electricity generation industry. Our breadth of products and reputation for quality makes us an easy choice.

When designing an energy storage system, engineers need to consider applications in two distinct areas, the system architecture and the system components.

System architecture

The architecture of an energy storage system is determined by the industry segment that the energy storage system is designed for. Applications within the utility, commercial, residential, renewal energy, and telecommunications segments all require different system architectures based on the needs of that segment.

Learn more

BMS components

The components of an energy storage system are similar in each of the industry segments. All systems require power input and output, power conversion, monitoring, control, and storage. Each component of the system has its own connector needs, and all components must work together to provide total reliability of the system.

Learn more

Device connector solutions

Regardless of the architecture and components of a system, there are power, network, and control signals that require reliable, high-quality, robust connectors. OEMs need a connector company they can trust. Cost pressures are forcing energy-storage OEMs to find ways to make their products modular, scalable, and easy to install and maintain. Phoenix Contact's device connector solutions are a perfect fit for this.

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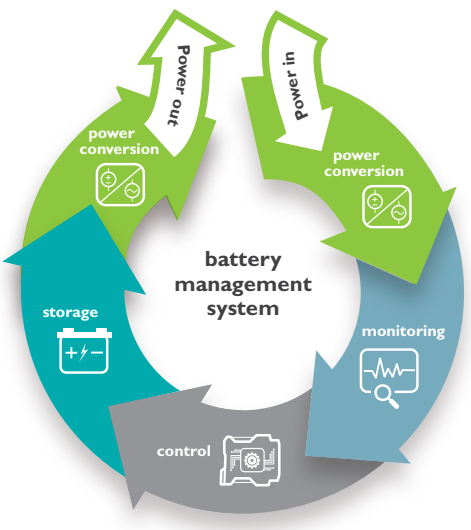

Energy storage system architecture

Energy storage systems are designed for the industry segment where they are needed. Utility, commercial, residential, renewable energy, and telecommunication systems all have their own unique needs.

Cost pressures are forcing energy-storage OEMs to find ways to make their products modular, scalable, and easy to install and maintain. With new high-power and hybrid connector technologies, and our broad line of industrial-grade network connectors, you can trust Phoenix Contact's device connector solutions for all your energy storage needs.

Energy storage system components

Energy storage systems also utilize multiple components, including power input and output, power conversion, monitoring, control, and storage.

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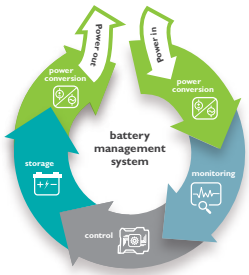

CONNECT
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Phoenix Contact's connector solutions meet any application for power, network, and control signals, making us the perfect fit for energy storage connectivity in any of these industry segments.

When requirements can't be met with off-the-shelf connectors, an application-specific solution is needed. Phoenix Contact has the capabilities and expertise needed to provide fully customized solutions.

Energy storage for commercial buildings

Commercial energy storage systems are used in data centers, factories, and municipal buildings for backup power and to help reduce energy costs by managing time of use and peak shaving. Commercial systems utilize cabinets for their architecture. Battery cells and modules are wired together in series to increase power. These modules are located in the cabinets along with the battery management system. Phoenix Contact's device connectors are an ideal solution for the power, network, and control signals, all scaled for the medium-sized power requirements for commercial buildings.

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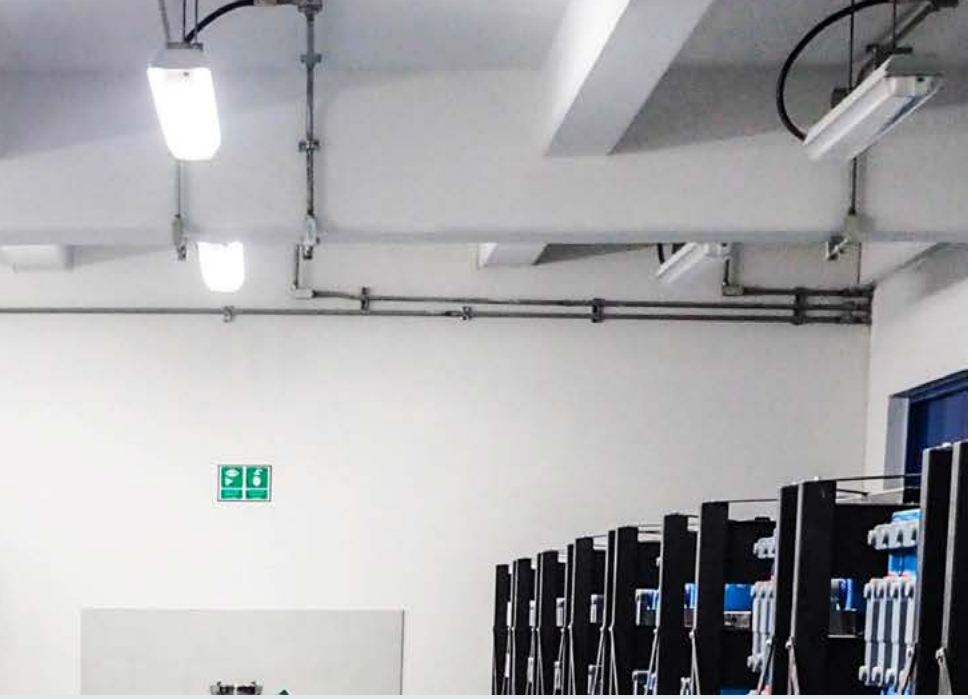

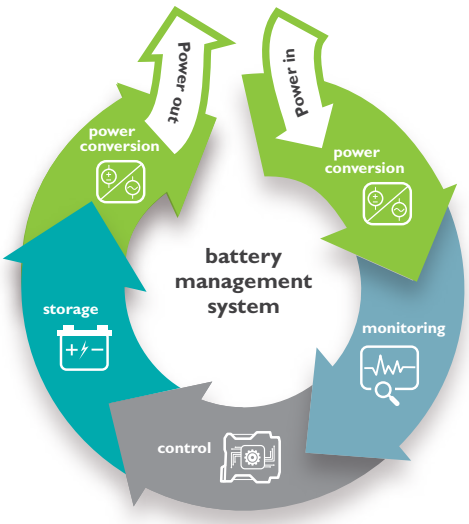

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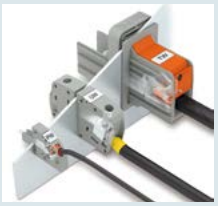

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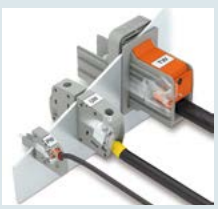

Discrete wired through-panel connections for control signals

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Small cases for monitoring and switching

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Energy storage for utility systems

Utility energy storage systems are used to help with frequency regulation and capacity softening, and play a key part in microgrids. These systems utilize multiple battery modules mounted in racks for their architecture. These racks are placed in a container along with the battery management system and other critical systems like security, fire, and air conditioning. Phoenix Contact's device connectors are an ideal solution for the power, network, and control signals needed for rack-mounted batteries as well as all other systems, all scaled for the high power requirements for utility systems.

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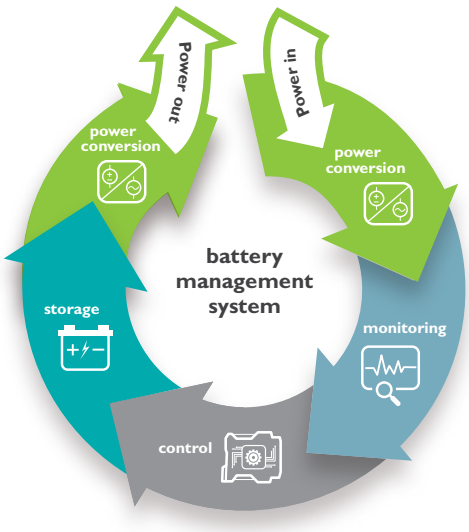

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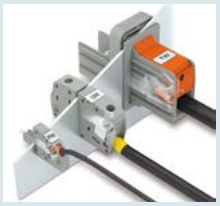

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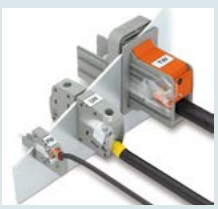

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Energy storage for renewable systems

Energy storage is the key to unlocking the full potential of renewable energy systems by making them more reliable. Renewable energy systems can utilize multiple architectures, like the stand-alone cabinets used in commercial storage or the battery racks placed in large containers used in utility storage systems. The difference in a renewable energy system is the need for connectors rated for outdoor use, like photovoltaic connectors. Phoenix Contact's device connectors are an ideal solution for the power, network, and control signals needed in renewable energy systems.

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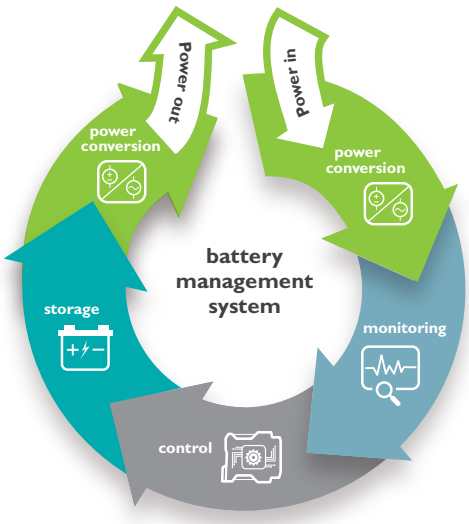

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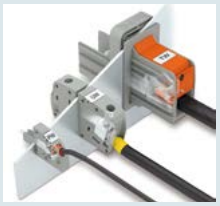

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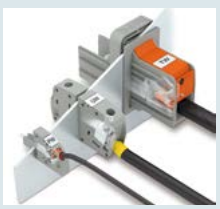

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Energy storage for residential systems

Residential energy storage systems are saving homeowners money through net metering and utilizing grid power during low-cost times of the day. These systems utilize smaller cabinets for their architecture that can be placed in multiple areas of the home. Some are located in low-traffic areas like the basement or garage in close proximity to the meter, while others are placed in high-traffic areas like living and family rooms. Phoenix Contact's device connectors are an ideal solution for the power, network, and control signals, all scaled for the medium-sized power requirements for residential buildings.

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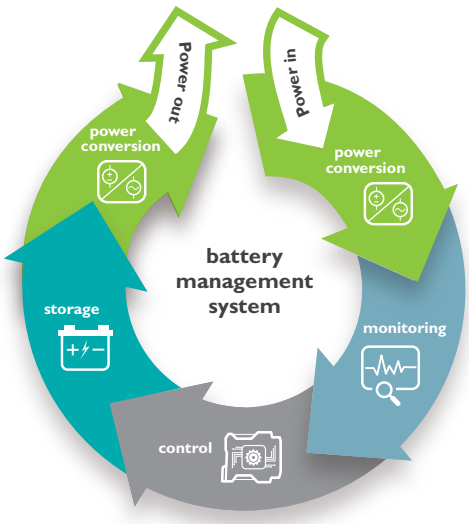

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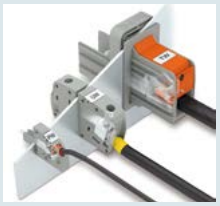

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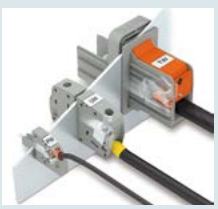

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Energy storage for telecommunication systems

Telecommunication energy storage systems are critical to the new 5G network. They provide backup power for critical communications. These typically have smaller power requirements placed in cabinets for distributed antenna systems. These cabinets can be indoors or outdoors, and they could be mounted on a pole or on a ground-level pad. Phoenix Contact's device connectors are an ideal solution for the power, network, and control signals, all scaled for the smaller power requirements of a telecommunications system.

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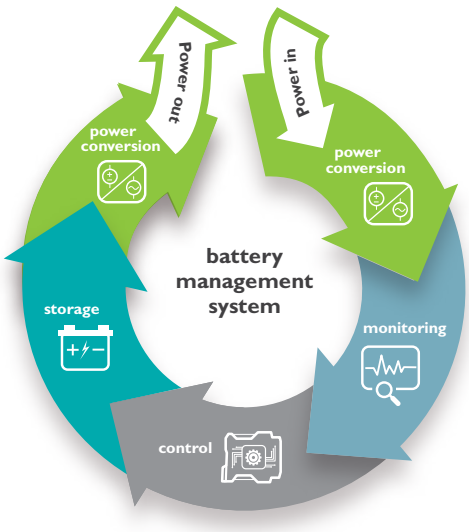

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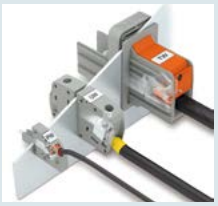

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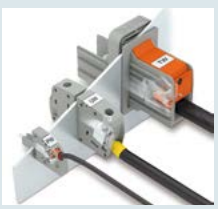

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Outdoor-rated cases

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Energy storage system components

All energy storage systems are more than just batteries sized for the power requirements. They are systems that utilize multiple components, including power input and output, power conversion, monitoring, control, and storage. Each component plays an important role, and they must work together within the system. Each component needs high-quality, reliable connectors for power, network, and control signals.

Cost pressures are forcing energy-storage OEMs to find ways to make their products modular, scalable, and easy to install and maintain. With new high-power and hybrid connector technologies and our broad line of industrial grade network connectors, you can trust Phoenix Contact's device connector solutions for all your energy storage needs.

Energy storage system architecture

Each energy storage system requires different architectures dependent on the specific industry segment.

Learn more

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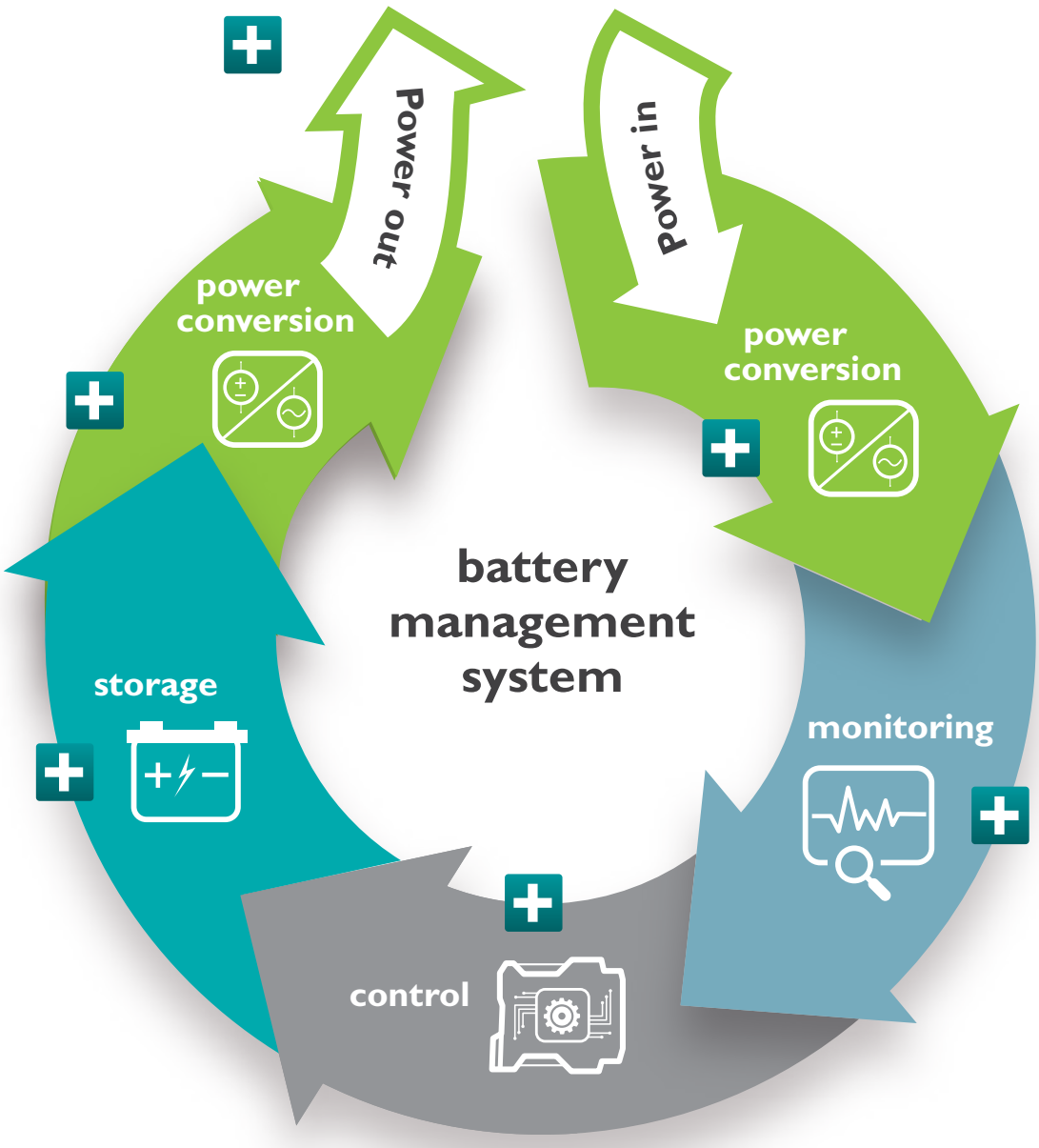

Power input and output

Power in and out of the system can utilize pluggable connections to prevent installers from getting into the cabinet. This prevents unwanted access to the energy storage system and increases reliability and security. Pluggable connections also provide quick change out in the case of maintenance or increasing the scale of the system.

Connector requirements need higher current and voltage levels. They could be routed through the panel box or cabinet, and in some cases, they are rated for outdoor use.

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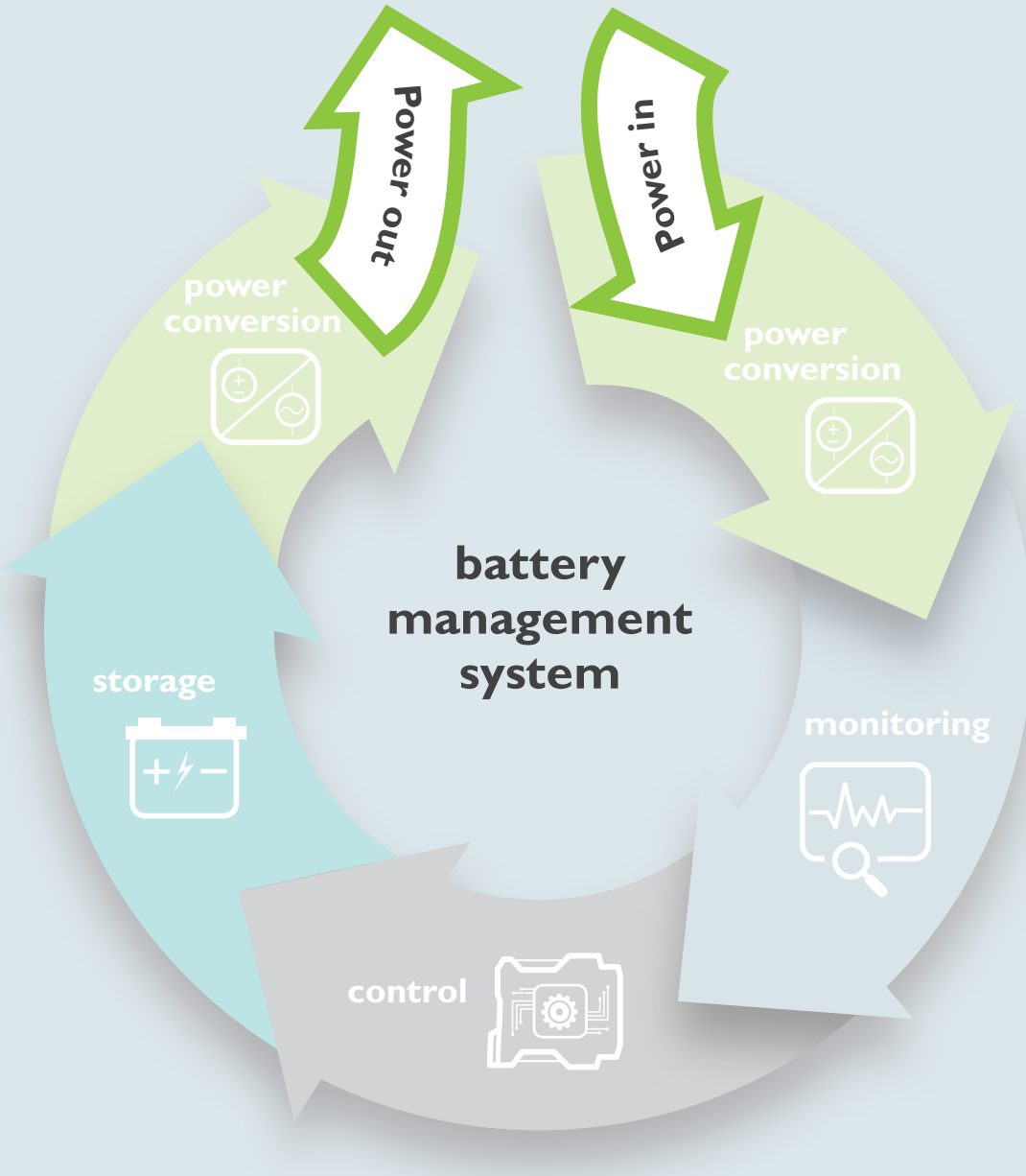

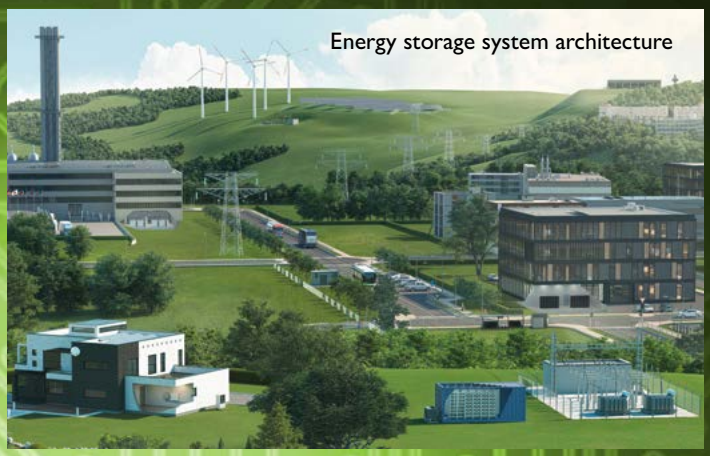

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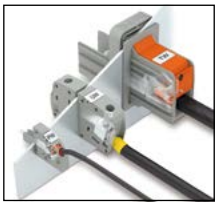

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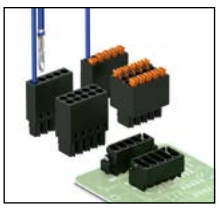

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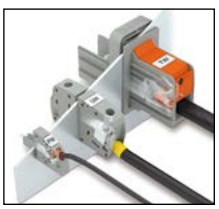

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Power conversion

The power conversion component of an energy storage system needs to be highly efficient and reliable. Power conversion can be the biggest problem in energy storage systems due to the changes in the various locations a storage system can be placed. Power conversion hardware needs the electronics housings that package and mount them to have easy mounting and connectivity options. Connector requirements need the highest-quality connectors to ensure the cleanest power available. Power and control signals can be found in the power conversion component of an energy storage system.

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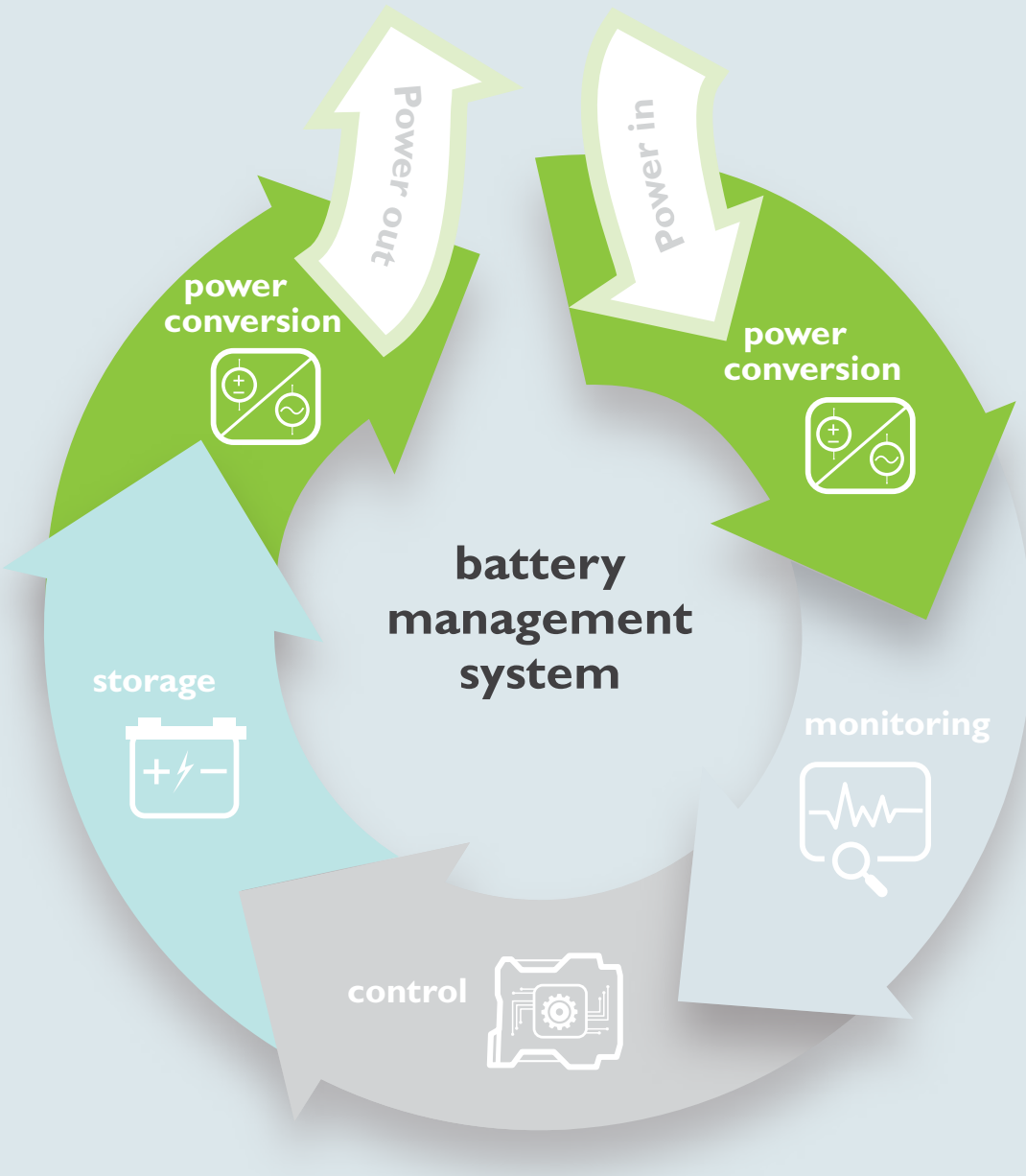

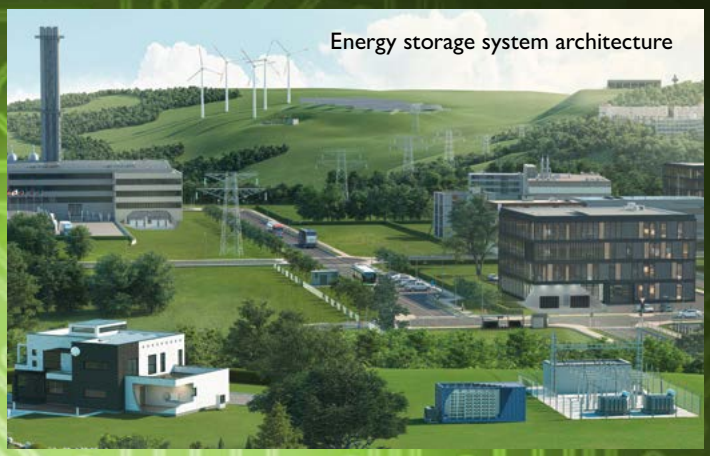

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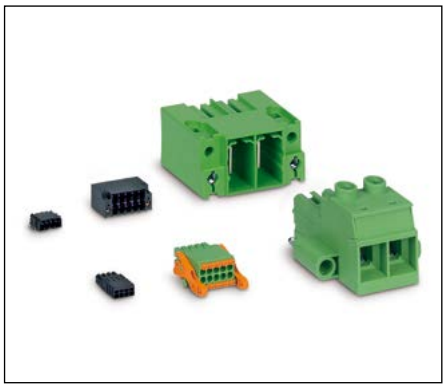

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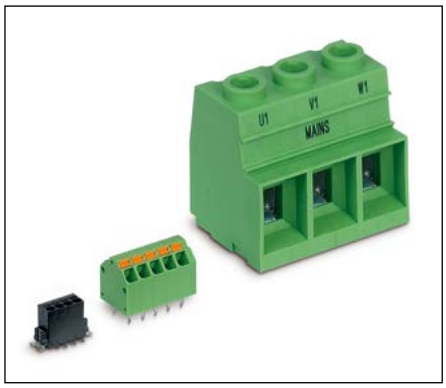

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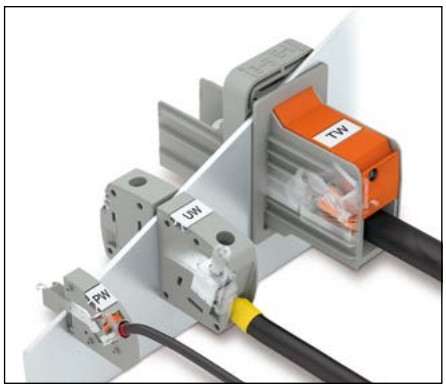

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Monitoring

Monitoring is a valuable component in the energy storage system. Monitoring allows for proper conditioning and preventative maintenance at start-up and throughout the life of the system. It also gives users like the homeowner or power company the comfort of knowing what they system is able to produce. Monitoring hardware needs the electronics housings that package and mount them to have easy mounting and connectivity options. Connector requirements are typically network and control level signals.

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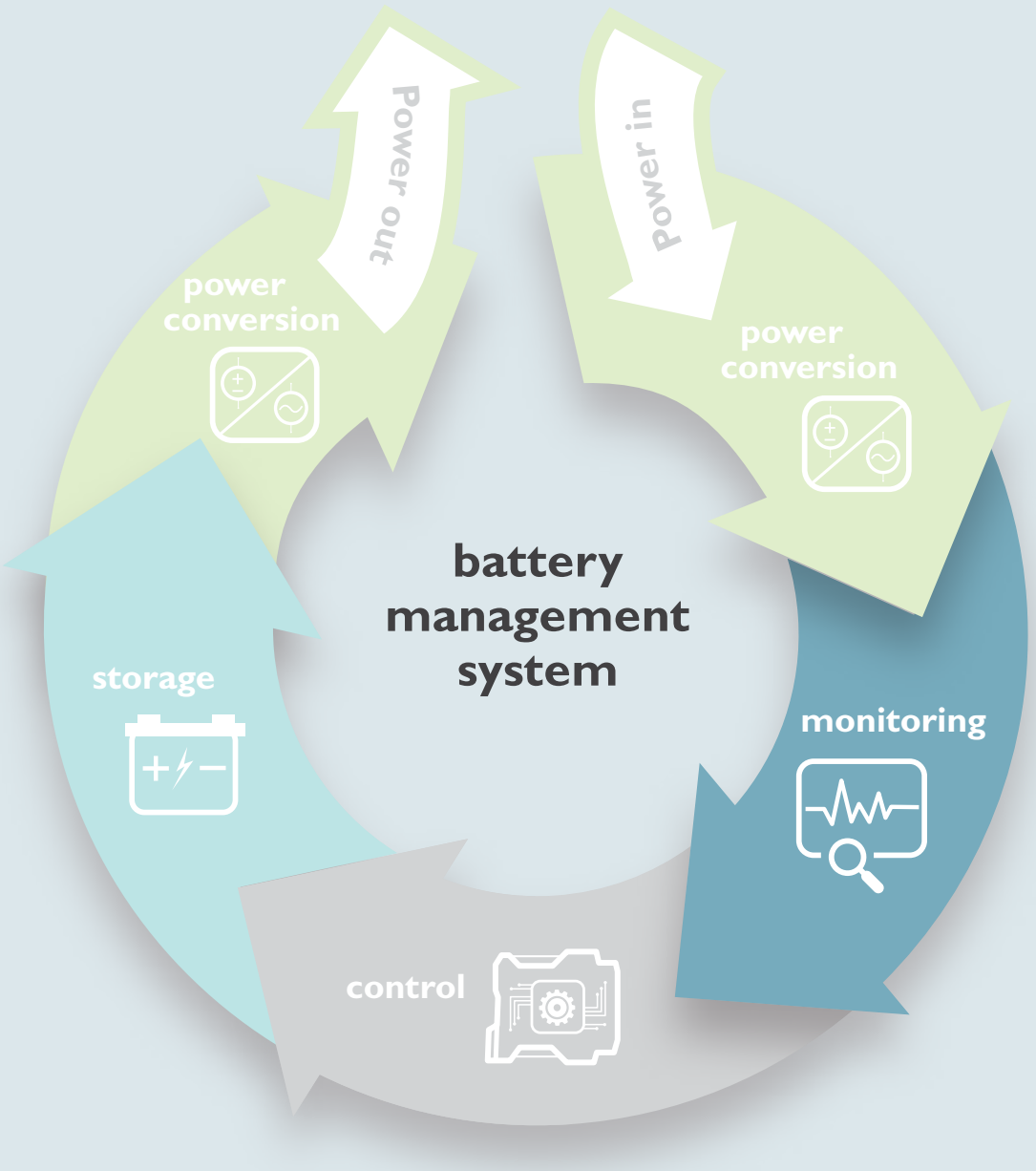

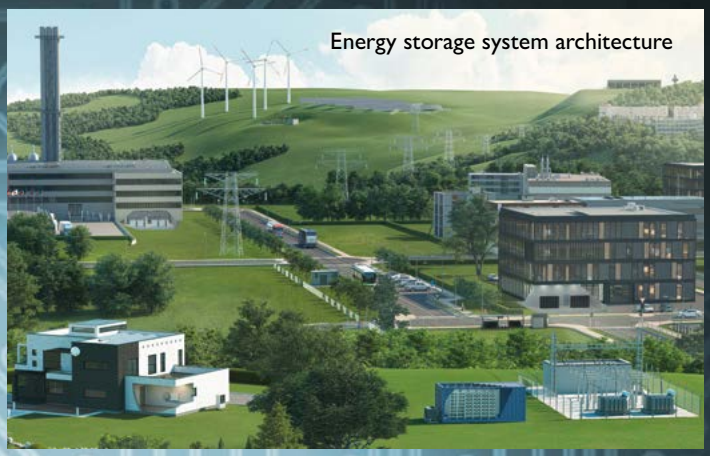
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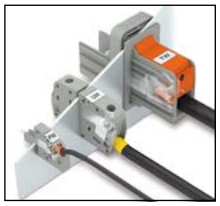
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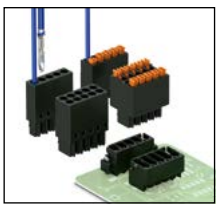
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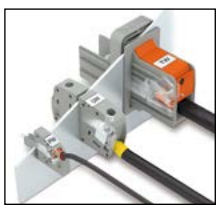
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Control

Control of the energy storage system is critical. It allows for proper charging and discharging of the batteries to increase their life and make the system safe and reliable. Control hardware needs the electronics housings that package and mount them to have easy mounting and connectivity options. Connector requirements are typically network and control level signals.

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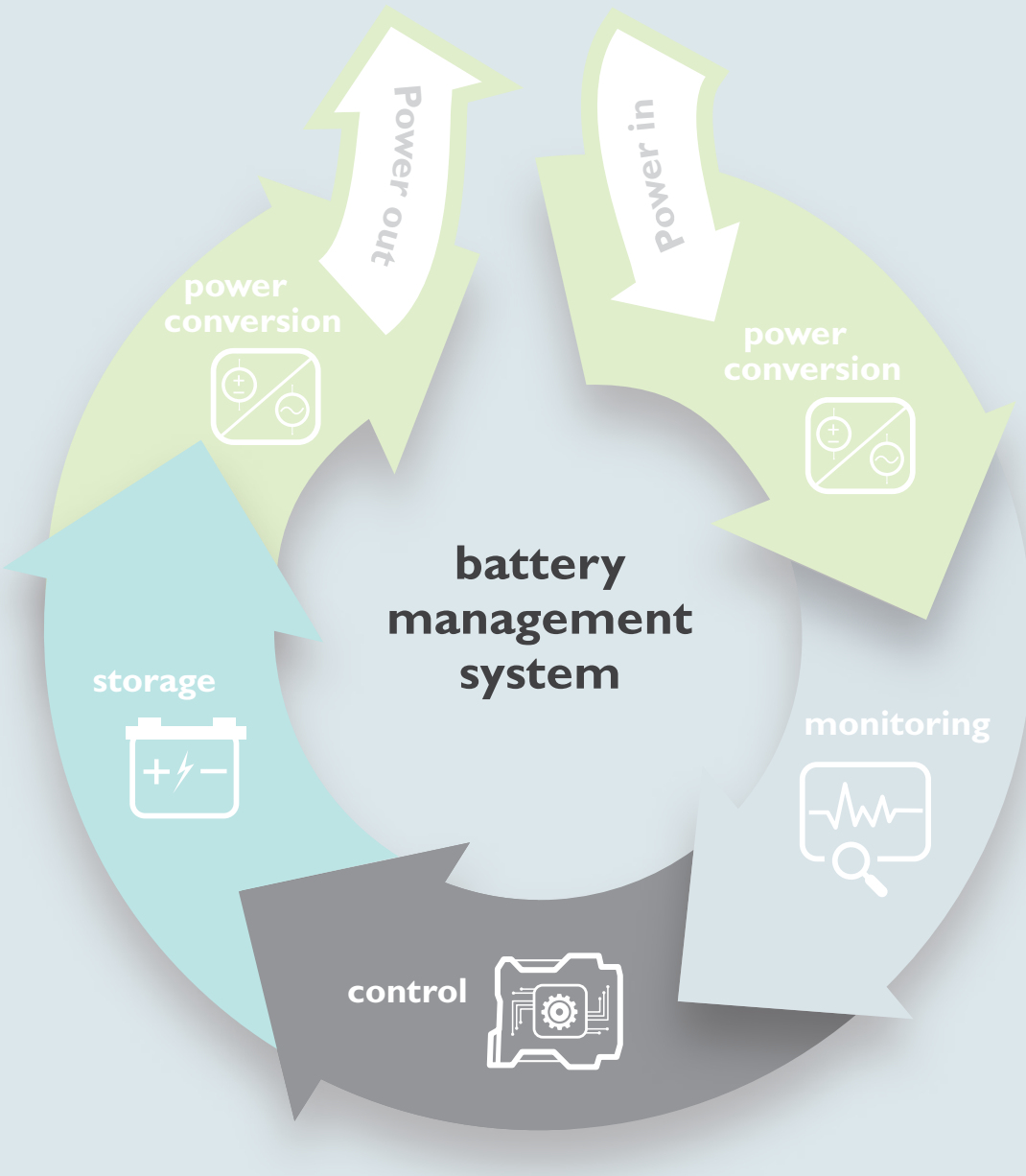

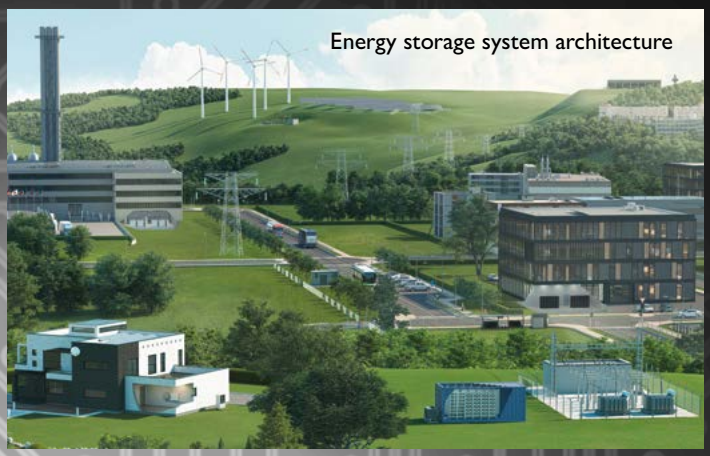
Energy storage system architecture

Power connectivity


High-powered energy storage battery pole connections

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Discrete wire fixed and pluggable connections for power input

Learn more


Discrete wired fixed terminal blocks for power input

Learn more


Hybrid rectangular connectors

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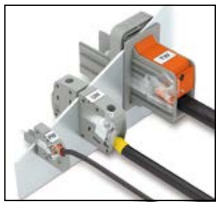
Discrete wired through-panel connections

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Small enclosures for monitoring and switching

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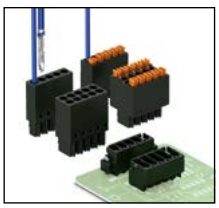
Network connectivity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High-speed board-to-board connectors

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Copper-based data connectors

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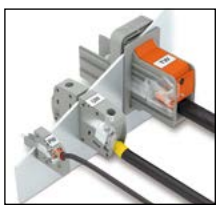
Discrete wired through-panel connections

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Small enclosures for monitoring and switching

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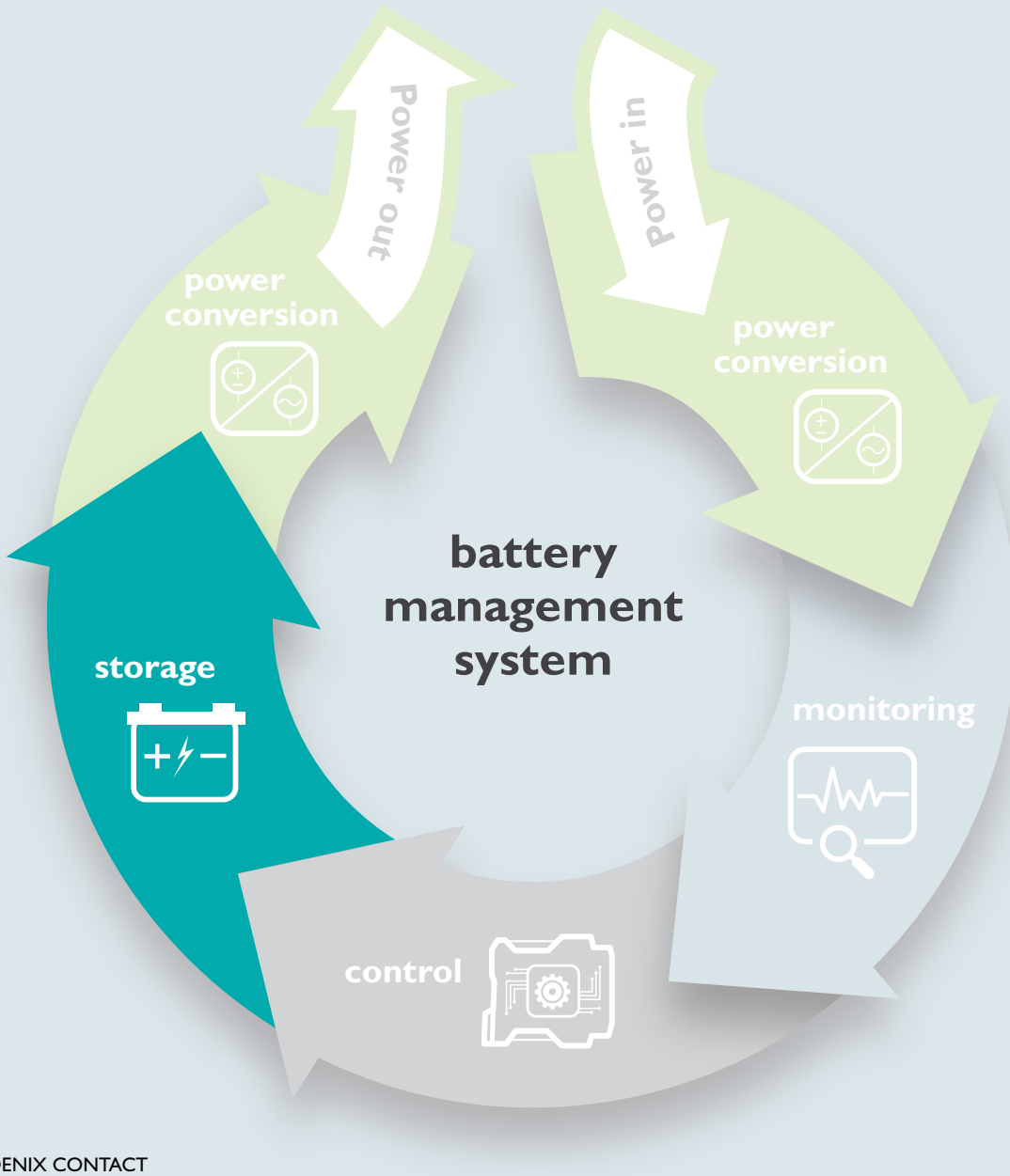
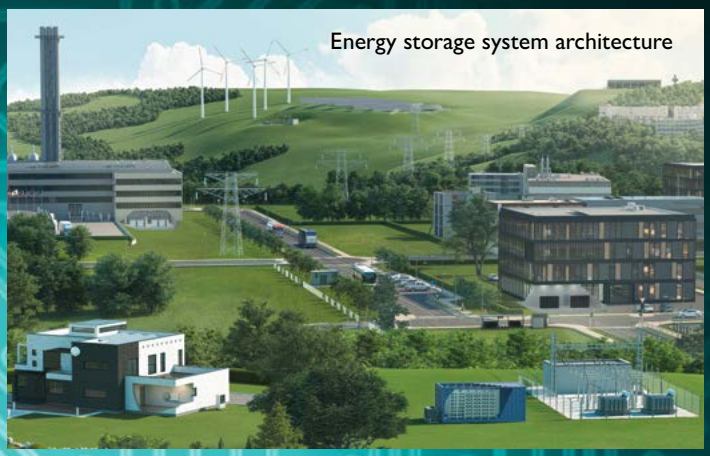
Storage

The storage component of an energy storage system is the battery. It is the heart of the system and the component that's subject to the most advances in technology. Batteries need pluggable connections to make them easy to maintain and easy to expand and scale up the entire energy storage system. Connector requirements are power, network, and control level signals.

CONNECT
WITH CONFIDENCE

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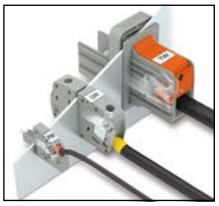
Discrete wired through-panel connections

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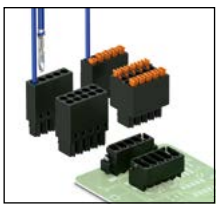
Network connectivity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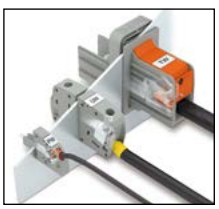
Discrete wired through-panel connections

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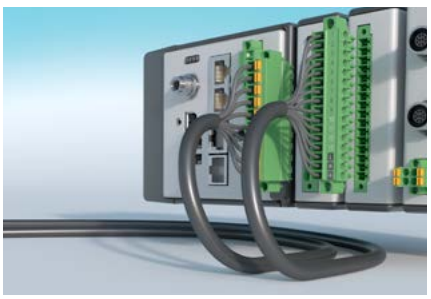
CONNECT

Power

Bringing power to your device can mean milliamps and millivolts or hundreds of amps and volts. Whatever your need, Phoenix Contact offers fixed, pluggable, and through-panel solutions to bring your products to life. Our products cover all applications, from indoor IP20 connectors to robust IP67-rated circular connectors for harsh environments.



Control

At the heart of any automated process is the need to monitor inputs and control outputs. Whether an application requires several hundred points to maintain or just a few, the connectivity to those points is a critical part of the system's ultimate success. Phoenix Contact offers proven internal and external connections for control equipment in just about any environment.

Learn more

Network

Our expertise spans a range of applications in both copper and fiber optics, so you can make network connections with complete confidence. Whether your connection is on a printed circuit board, through an enclosure, or to a field device, you can trust Phoenix Contact for consistent quality, reliability, and high performance – every time.

Customer-specific adaptations

Whether you need individual colors, complete cable assemblies, special printing, or a specific number of contacts, we will be happy to help find solutions adapted to customer-specific requirements.

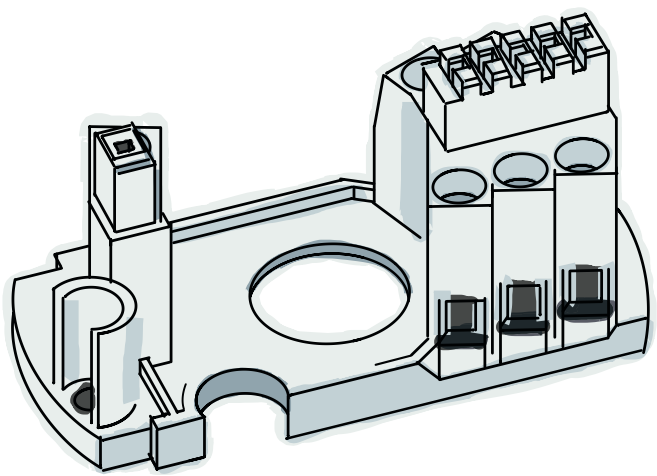
Learn more

Wide range of color versions

Customer-specific cable assemblies

Individual printing

Special punching, coding, and pin lengths



When you can't find the ideal solution in our standard product catalog

Phoenix Contact's connector solutions meet any application for power, network, and control signals, making us the perfect fit for energy storage connectivity.

When requirements can't be met with off-the-shelf connectors, an application-specific solution is needed. Phoenix Contact has the capabilities and expertise needed to provide fully customized solutions.

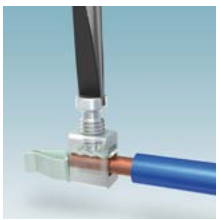
Learn more

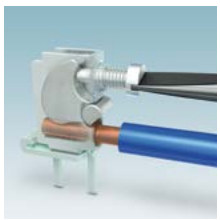
The right solution for every application

As the world leader in discrete wire termination, Phoenix Contact has the right solution for your application. With multiple wire termination technologies, PCB connection technologies, and through-panel connections, our breadth of product is second to none. Our new board-to-board connectors allow you to utilize our quality and innovation inside the device as well.

Our products are designed for global use, meeting multiple standards and agency approvals. With a reputation for the highest quality in the world, Phoenix Contact has the right solution for every application.

Learn more


Screw connection with tension sleeve


Front screw connection


Screw connection with wire guard


Bolt connection


T-LOX knee-lever connection

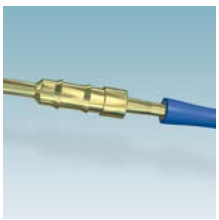

Combination spring


Push-lock spring connection

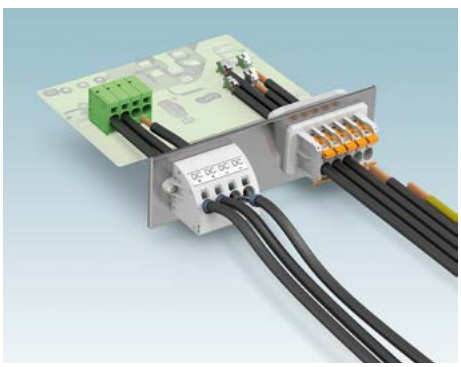

Push-in spring


Spring-cage connection

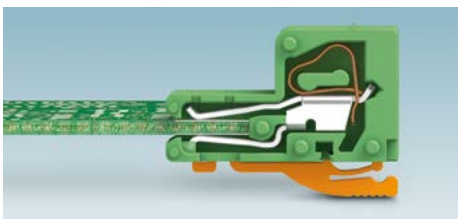

Insulation displacement connection

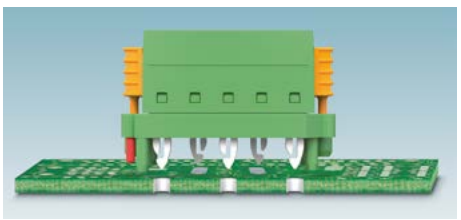

Piercing connection

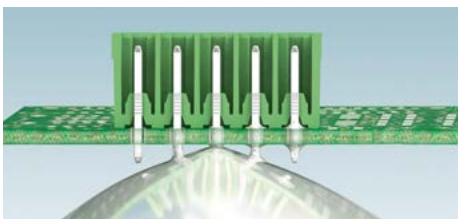

Crimp connection

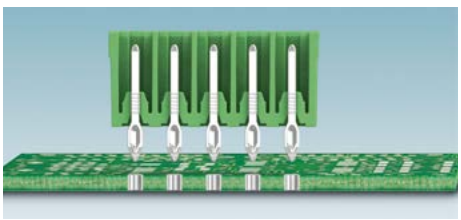



Through-panel connections


Direct connection technology


SKEDD pluggable technology


Wave soldering


Press-in technology


SMT soldering


THR soldering

Ongoing communication with customers and partners worldwide

Phoenix Contact is a global market leader based in Germany. We are known for our future-oriented components, systems, and solutions in the fields of electrical engineering, electronics, and automation. With a global network reaching across more than 100 countries and with more than 17,400 employees, we stay in close contact with our customers, something we believe is essential for success.

Our wide variety of innovative products makes it easy for our customers to find future-oriented solutions for multiple applications and industries. We focus predominantly on the fields of energy, infrastructure, process, and factory automation.

You can find your local partner at

www.phoenixcontact.com

INSPIRING INNOVATIONS

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