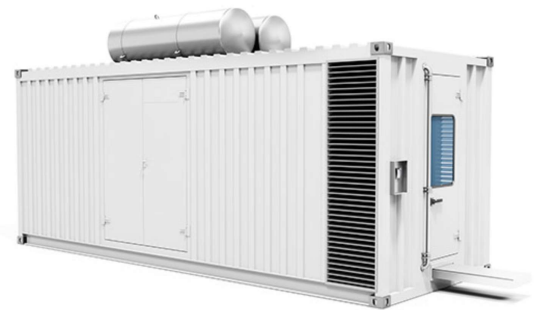


# Top Things to Consider for Energy Storage System Connectors

From medium scale commercial or residential units to large scale electrical grid installations, energy is stored and stabilized by a set of equipment that includes Lithium-ion batteries, inverters and [Power Conditioning Systems \(PCS\)](#), together called an [Energy Storage Systems \(ESS\)](#).

ESS is a mainstay in the smart homes of today. They are generally wall-mounted battery units that are connected to AC/DC inverters. The residential system manages the peak and off-peak power requirements of the household and feeding them back to the larger Power grid, which is responsible for managing the power requirements of the locality.

For Commercial or Industrial applications this same set-up is duplicated; several battery modules are stacked together to form a rack. Multiple racks are then stacked to form a container unit that is part of the larger Smart Grid. These are often deployed at renewable energy sites like wind or solar power stations. The energy created by these resources are captured and stored by the ESS, and doing so avoids the breakout of massive frequency fluctuations caused by an excess of power being pumped to the grid, thus providing the network with reliable and quality power.



Amphenol provides a range of [high power connectors](#) and many more advanced interconnects for ESS.

## Connectors for Commercial and Industrial ESS



Battery Storage System is at the heart of the ESS. Amphenol has Busbar connectors and cables as well as Input Output solutions going into 48V / 1000V / 1500V Lithium ion battery racks. Our BarKlip® connectors offer the smallest 150A+ ESS solution in the market with a high current rating of up to 160A /200 /300A per contact @ 30°C T-Rise. With a wire range of 8AWG-0AWG, these connectors feature latch retention force greater than 100N, Terminal Position Assurance (TPA) feature and multiple coding options.

We also offer [PwrBlade® connectors](#) with current range up to 60A per contact and a low resistance of 0.4mΩ. The PwrBlade® Mini Mezz is available in high power 50A/contact and low power 25A/contact

variants. Additionally, our low profile, high density HPCE® connectors are ideal for commercial and industrial ESS battery modules.

## Residential ESS and Connectivity

When it comes to residential housing, ESS becomes part of an elaborated Home Energy Management System (HEMS). Generally, the electric energy created from solar panels are stored inside the battery unit through distributed controllers, which then are as per energy requirements, further passed on through AC/DC inverters to finally reach the switches and plug outlets. Smart meters capable of identifying peak and off-peak hours are also deployed.

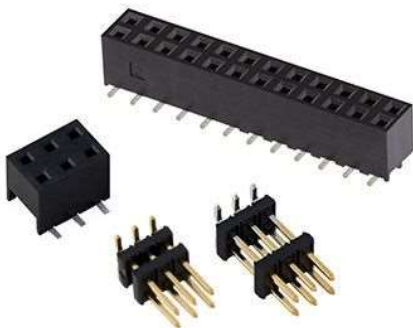


Controlling, Measurement and Communication are the key functions of HEMS, and are carried out with the support of different interconnect systems.

In addition to the above-mentioned PwrBlade® connectors, there are wire-to-board, wire-to-wire, FPC-to-board, board-to-board and input output connectors going into inverters, controllers and system components of residential ESS.

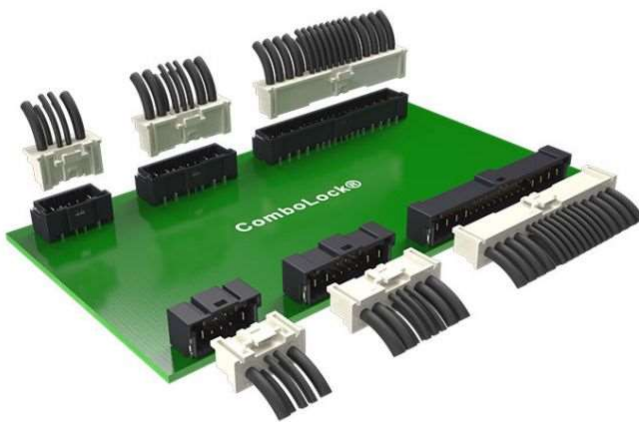
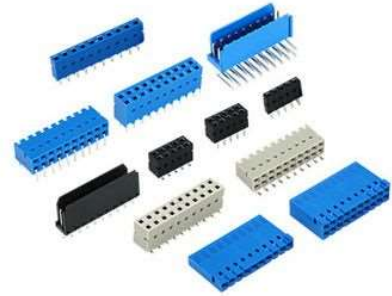
## Wire-to-Board/Wire Connectors

Amphenol has a range of fine pitch wire-to-board signal connectors that support various components of an ESS. Our industry proven [Minitek® fine pitch connectors](#) are offered in 1.20mm, 1.00mm, and 0.80mm pitch with polarized housing and active latch versions for secure mating; and include glow wire compatible version.



Minitek® 2.00 Modular Connector System is an industry-recognized brand name and proven solution for reliable wire-to-board connections. Originally being developed for the disk-drive market early 90s, Minitek® is now a complete product family built around a reliable dual beam contact system, enabling reliability of long system life applications. Minitek's® active latch crimp to wire housing is a proven solution which prevents un-intentional cable release.

For less space constraint applications like inverters, we also offer Dubox® connectors on 2.54mm pitch. Dubox® is built around a dual beam box contact system with pre-stressed contact beams, which ensures a high number of mating cycles and reliability over time. Dubox® offers a contact system which is much more vibration and shock resistant than tuning fork contact systems we see in the market as well.



To meet the needs for more compact signal and power wire to board connectors, Amphenol recently introduced a new hybrid connector system ComboLock®, which offers power distribution (10A) and power control in one connector. ComboLock® saves space, ensures simpler assembly and guarantees simpler cable management.

### Board-to-Board Connectors

Amphenol's Board-to-Board, pin-on-socket connectors for ESS include Minitek® 2.00mm and Dubox® and BergStik® connectors on 2.54mm.

Minitek® and Dubox® are also recognized for [Wire to Board](#), and BergStik is the family of unshrouded headers, made from drawn wire, with perfect symmetrical pin tips and smooth surfaces to guarantee a high number of mating cycles and reliability over time.

Scalable, fine pitch, and [high density mezzanine](#) interfaces like 0.80mm pitch BergStak®, 0.5mm pitch MezzoStak® with its Hermaphroditic “mates-to-itself” design, and the most reliable 1.00mm pitch Conan® with audible “click” snap engagements, are exciting ESS show-stealers from Amphenol to watch out for.

And similar to the requirements for wire-to-board, Amphenol recently introduced a new hybrid connector system called [ComboStak®](#), which offers power distribution (20A) and power control in one connector. ComboLok® eliminates the tolerance risks when using 2 connectors (1 for power; 1 for signal) in mezzanine applications. On top: ComboLok® saves space and ensures simple and reliable board assembly thanks to its polarized and ‘scoop proof’ housing design.



Also worthwhile to mention is Amphenol's broad range of 0.50mm and 1.00mm [FFC-FPC connector](#), with 'cable lock' options for demanding applications. Apart from these, Amphenol has an extended variety of extremely small high reliability I/O connectors like Micro USB 2.0 and 3.0, with speeds ranging from 480Mb/s to 5Gb/s.

### **Harsh Connectors for ESS**

Amphenol also offers IP67 solutions with unique protection to customer's ESS and UPS (Uninterrupted Power Systems) and for meeting other harsh environmental conditions. Our [Harsh connectors](#) offered for ESS includes Harsh USB 3.0 and USB Type C variants along with Harsh MRD Solutions.

Amphenol Barklip® connectors offer a high current rating of up to 300A /400A /500A per contact with the option of IP67, which is tailor-made for liquid-cooling ESS.

Check out our extensive solutions and capabilities for [Energy Storage Systems](#).