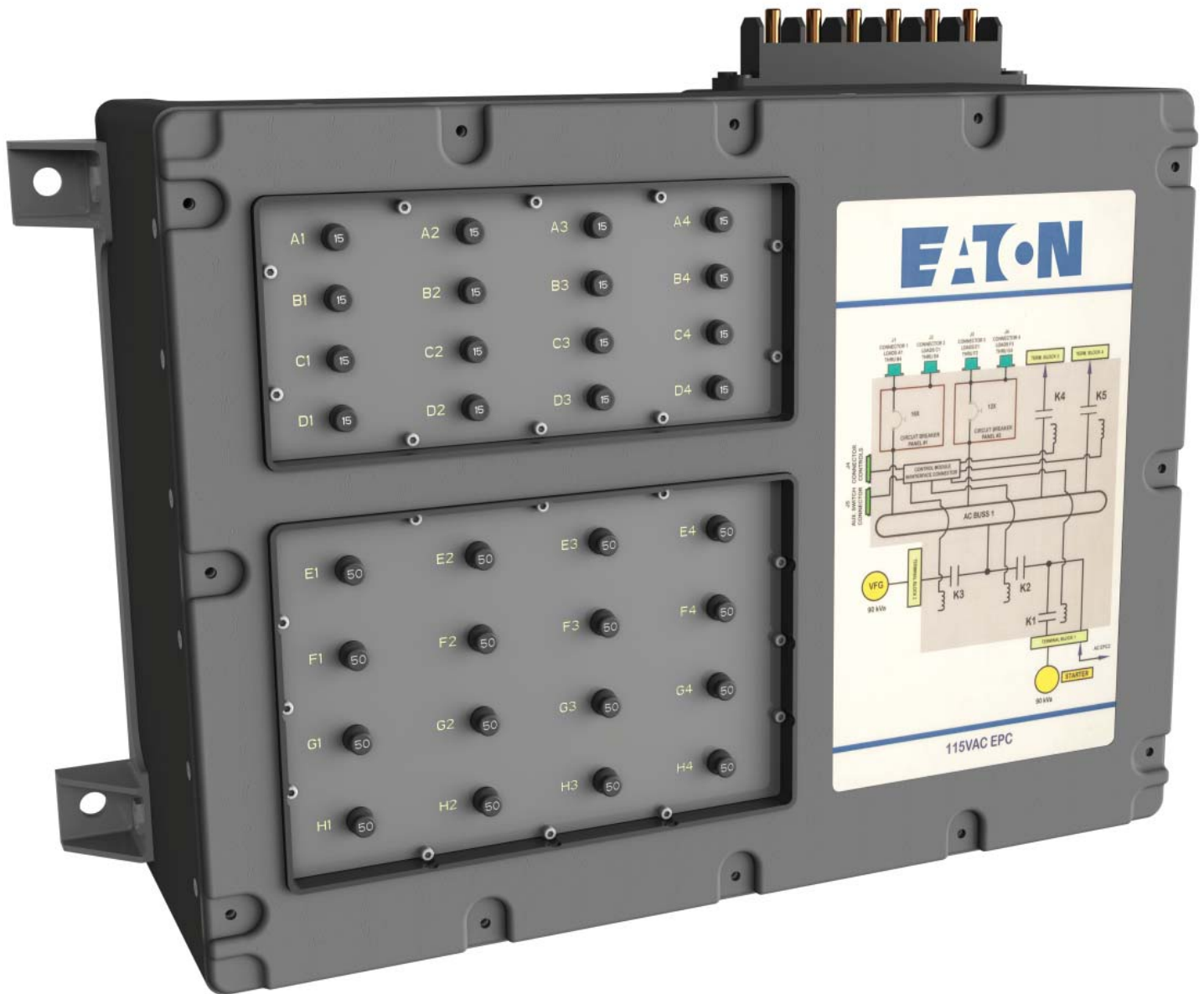


Advanced Power Distribution Unit



Powering Business Worldwide



Eaton's Advanced Power Distribution Unit: A Breakthrough in Efficiency, Weight Savings, Reliability and Maintainability

Eaton's advanced power distribution unit (APDU) is the next-generation solution for power generation and distribution. The innovative "error free" design eliminates workmanship issues, improves thermal efficiency, reduces weight, and significantly enhances maintainability. It is an efficient use of space, lighter weight, and the next level in aerospace design.

The innovative design of Eaton's APDU is a result of addressing numerous application challenges over the years. By efficiently integrating proven relay, contactor and circuit breaker products into a single-line replaceable assembly, Eaton has developed a customizable power module. The APDU uses innovative and patented building blocks, developed by Eaton, that significantly reduce overall system weight and improve system-level reliability and maintainability.

Additional advantages include ease of installation and accessibility, lower on-aircraft test time, and reduced overall aircraft build time, since the Eaton PDUs support both current and evolving higher power architectures.

Eaton has been using composite structures in aircraft power distribution units for reduced weight and thermal optimization since the early 1990's. These approaches have been supplemented in the APDU by the integration of Eaton's pioneering plug-in circuit breaker panels. Eaton's ability to readily modify standard thermal and arc-fault circuit breakers into a socket-and-pin mounting scheme allows individual protective devices to be installed, interchanged, or replaced from the front of the panel. This scalable design uses no panel mounting hardware, terminal hardware, visible wiring runs, or exposed bus work.

With only a single tool, a circuit breaker can be removed or a new one added in minutes.

The new design also eliminates point-to-point wiring by embedding the current bus work within a proprietary engineered material that is thermally conductive and electrically insulative. This innovation eliminates assembly errors, reduces potential maintenance-induced wiring damage, protects from Foreign Object Damage intrusion, moderates thermal hot spots, and lowers operating temperatures. This also allows for current carrying elements to be optimized for weight and power dissipation and route primary heat sources outside the assembly.

Eaton's commercial relay portfolio includes more than 1,000 different relays and contactors for 28VDC, 115VAC, and HVDC applications. Current sensing, arc-fault detection, and lightweight generator contactors are all well adapted for customized power distribution units using the integrated APDU design approach. Eaton's new product developments in high-voltage DC contactors, variable frequency AC, and "smart" contactors with advanced control features, can be readily integrated into the APDU in a broad range of applications for commercial or military aircraft and the ground vehicle market.



Compact design and use of advanced materials

Eaton manufactures the ADPU enclosure with a composite thermoplastic material that is lighter, stronger and more durable than materials used in the past. The compact design and low-weight structure provide component protection and structural rigidity as well as a thermal heat-optimized solution that is electrically insulated. Eaton's new design decreases overall weight by 25% to 35% compared to conventional units. It also reduces operating temperatures of contactors, terminals and bussing by up to 50°C, thereby decreasing thermal stress and increasing reliability.

Lower Profile

Designed to replace bulky conventional panels, Eaton's customizable plug-in circuit breaker panel offers significant weight and space savings, flexible configurations, enhanced thermal efficiency and higher reliability.



Design features that facilitate ease of installation and maintenance

Easier access enables circuit breakers and contactors to be replaced more quickly, and the virtually wireless design reduces the opportunity for errors. Fewer wiring connections strengthen reliability, and the APDU is readily adaptable for modifying or adding circuits.

Integration of APDU electronics with integrated plug-in circuit cards used for relay control, current monitoring and logic functions

Eaton's integrated APDU electronics module provides voltage sensing of individual circuit breakers (open or closed), current sensing circuit of the main contactors and power busses (shunt-based design), and economizer circuits and electronic auxiliaries for the contactors/relays.



Thermally conductive/electrical insulative backplane with encapsulated conductors

Eaton's design embeds conductors within a thermally conductive and electrically insulative backplane that transmits heat from the primary heat sources (contacts and circuit breakers). These modules consolidate the wiring and buss work while directing heat to the mounting structure/airframe.

Near wireless design for manufacturability and higher reliability

Eaton's APDU design limits point-to-point wiring by using embedded bussing and integrated wiring boards for contactor control. This reduces wiring, hardware, fasteners and assembly labor by more than 50%, significantly reduces weight, and improves overall reliability.



Current sensing

Eaton's APDU provides voltage sensing of circuit breaker position and current sensing of the main feeder current. An optional common electronics module provides contactor economizing, electronic auxiliaries and prognostics.

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