

# Grounding Systems

Moving from Metals to Composite

Today’s carbon-fiber-reinforced polymer (CFRP) aircraft bodies present new challenges in creating reliable, maintainable grounding networks. Traditional metal airframes are ideal for harmlessly dissipating lightning strikes and electrostatic discharges. Metal fuselages act as Faraday cages, channeling electricity through the fuselage to provide constant voltage on all sides of the enclosure. As a result, no current flows through the space.

### Solving the Grounding Challenges of Composite Aircraft

CFRP composites have a lower level of conductivity compared with metals and therefore do not naturally create a Faraday cage.

New strategies for grounding and bonding are required to:

- Handle lightning, return, and fault currents
- Provide a bleed path for ESD
- Prevent damage to the composite
- Maintain a low-resistance pathway
- Minimize voltage differentials
- Provide electromagnetic shielding

Approaches like incorporating copper meshes into the composite’s layers provide sufficient conductivity, which can create the required Faraday cage. This approach, however, presents challenges in connecting and bonding the meshes to the aircraft’s metallic structures—with sufficient current-carrying capacity and distribution to handle currents.

### Distributed Connectivity

As the use of composites grows for structural elements, highly distributed grounding systems, composed of both dedicated grounding paths and traditional metallic elements, are required. Typically, the ground paths run longitudinally along the length of the aircraft and laterally around the fuselage’s circumference, and are bonded to provide redundant pathways. It is important to carefully analyze pathways to understand the flow of currents to ensure optimal performance and protection.

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Space and Weight-Saving System-Level Solutions for Aircraft Grounding and Bonding to Traditional and Composite Airframes

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## Grounding Systems

Solutions for Commercial Air

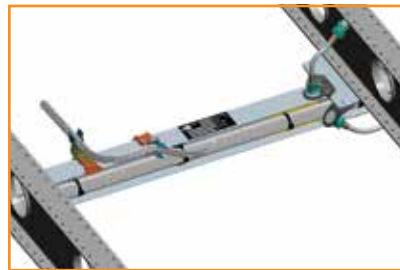
Space and Weight-Saving System-Level Solutions for Aircraft Grounding and Bonding to Traditional and Composite Airframes





### Connectivity Solutions for Today's Composites

As composites grow in use for aircraft bodies, there is less metal available for grounding and lightning protection. It is critical to know where the energy goes in the event of a lightning strike, short circuit, or other fault. Not only does the design need to be smarter, it needs to be complete. The system is the solution, and TE has the expertise to make it work.



TE provides system-level thinking and system-level solutions to grounding

### Aircraft-Specific Custom Systems

We've worked with leading aerospace companies to create innovative solutions custom tailored for a specific aircraft. So you get a system that meets your design and not a generic approach you need to adapt to your needs.

### Beyond Products to System Solutions

While we offer one of the widest ranges of products for grounding and bonding, our ability to integrate them into an elegant, hard-working solution is proof that the whole is greater than the sum of its parts.

### Early Involvement Allows Optimized Solutions

Talk to us early to leverage the full power of our expertise. Early on, we can take your preliminary requirements and recommend the best way to satisfy them technically and economically.

**TE Components . . . TE Technology . . . TE Know-how . . .**  
AMP | AGASTAT | CII | HARTMAN | KILOVAC | MICRODOT | NANONICS | POLAMCO | Raychem  
SEACON | Rochester | DEUTSCH

Empower Engineers to Solve Problems, Moving the World Forward.



#### Copper Ground Straps

##### High Performance

- Tinned copper for high conductivity
- Braided for flexibility
- High current-carrying capacity

##### Capable

- Traditional terminals or innovative quick-disconnect couplings



#### PIDG Pre-Insulated Terminals and Splices

##### Versatile

- Variety of tongue styles and platings
- 26 through 10 AWG
- MIL-T-2928 styles

##### Reliable

- Nylon insulation resists hydrocarbons



#### COPALUM Terminals and Splices

##### Versatile

- Terminates aluminum and copper conductors
- Dry crimp technology eliminates need for messy inhibitors
- 16 AWG to 500 MCM conductor range



#### Backshells

##### Wide Range

- Configurations for circular and rectangular connectors
- Raychem spin lock variable-angle backshells

##### High Performance

- Shield terminations for excellent EMC
- Strain relief and shielding



#### CTJ Series Terminal Junction Modules

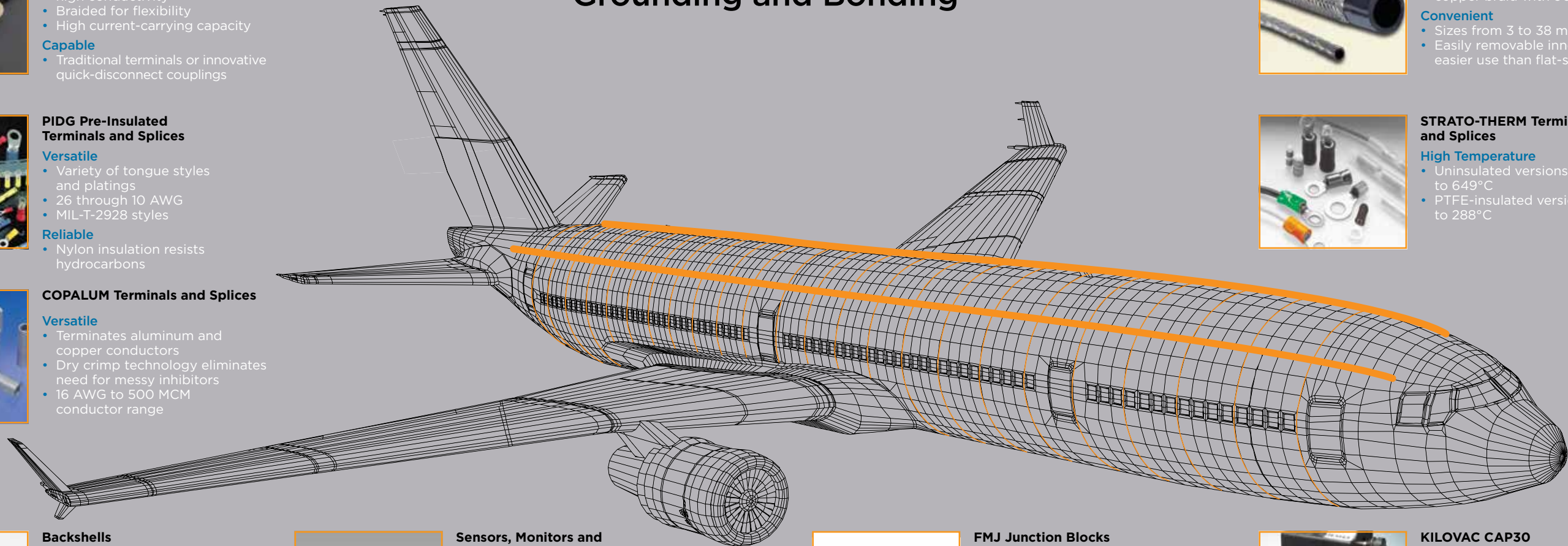
##### Rugged and Compact

- Environmentally sealed
- Fluid resistant
- Vibration dampening

##### Capable

- Common bussing of 6 to 20 contacts
- AS8714 styles

## The Complete System Solution for Composite Aircraft Grounding and Bonding



#### RayBraid Copper Braid

##### Flexible

- Superflexible tinned copper braid with 90% coverage

##### Convenient

- Sizes from 3 to 38 mm diameter
- Easily removable inner former for easier use than flat-supplied braid



#### STRATO-THERM Terminals and Splices

##### High Temperature

- Uninsulated versions up to 649°C
- PTFE-insulated versions to 288°C



#### Sensors, Monitors and Protective Relays

##### Over/Under Sensing and Monitoring

- Current
- Voltages
- Frequencies

##### Protection

- Ground power monitors
- Ground fault interrupters



#### INSTALITE Molded Boots

##### Weight-Saving Design

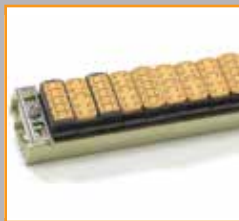
- 20-30% lighter than TE's -25 part

##### Time Savings

- Optimized interior geometry speeds installation time

##### Rugged

- Rayaten shielding provides abrasion resistance and resists most common military fuels, oils and greases



#### FMJ Junction Blocks

##### Modular

- Choice of 25 rail-mounted modules
- Light and compact
- Various bussing configurations

##### Flexible

- Sealed or unsealed
- Yellow and black anodized aluminum alloy



#### SolderSleeve Grounding Terminations

##### Flexible

- Environmentally sealed, insulated, and encapsulated solder connection
- Wide range of temperature ratings, from -65°C up to 200°C
- Prefluxed solder preform provides a controlled soldering process



#### KILOVAC CAP30 Ground Fault Interrupter

##### Capable

- Electrically isolates load in event of ground fault
- 115/200 VAC
- 15 amps/pole

##### Convenient

- Built-in push-to-test function



#### DBM Series Grounding Modules

##### Robust

- Fluid resistant, including aviation hydraulic fluid and JP5
- Lightweight nickel-plated aluminum shell
- 96-hour salt spray
- Accommodates twelve size 20 contacts for 80 A total current