



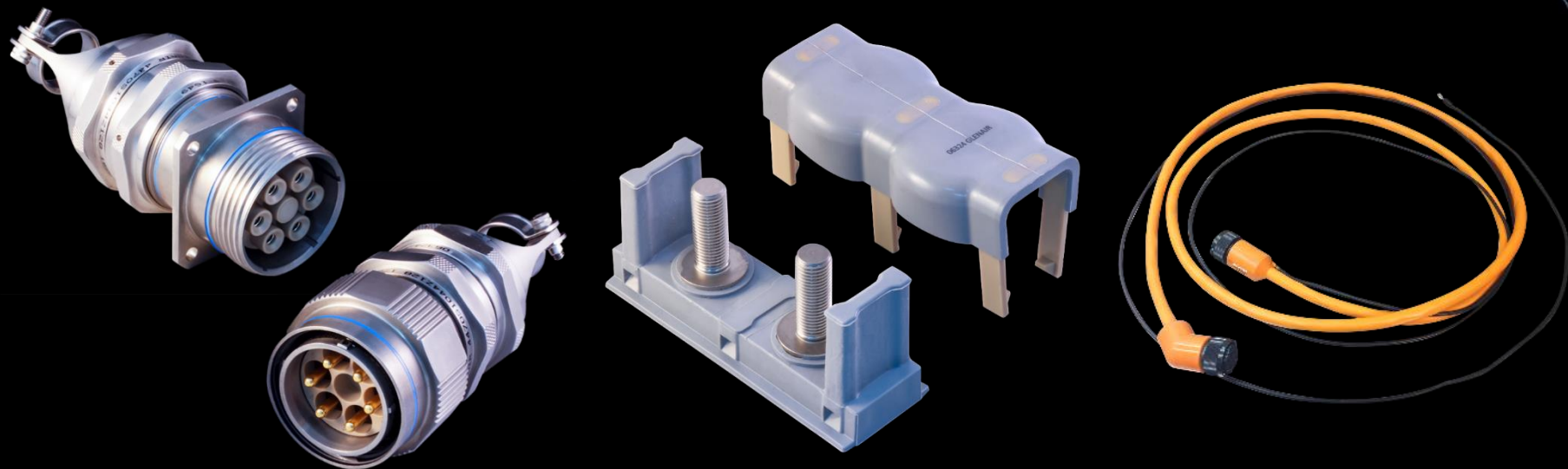
Interconnect Solutions for Distributed Power eVTOL Applications

Interconnect Solutions for Distributed Power eVTOL Air Taxi / UAM Applications

Presentation Overview

- Our interconnect technologies for urban air vehicle applications fall into four broad categories
 1. Electrical power propulsion system connectors, cables, and accessories
 2. Lightweight avionics, flight deck, actuator, and sensor connectors
 3. Wire and cable protection and management technology
 4. Shielding and grounding solutions for electromagnetic compatibility (EMC)

SMALL FORM-FACTOR • LIGHTWEIGHT • PROVEN AEROSPACE PERFORMANCE



Electrical Power Propulsion System
Connectors, Cables, and Accessories

PowerLoad Connectors

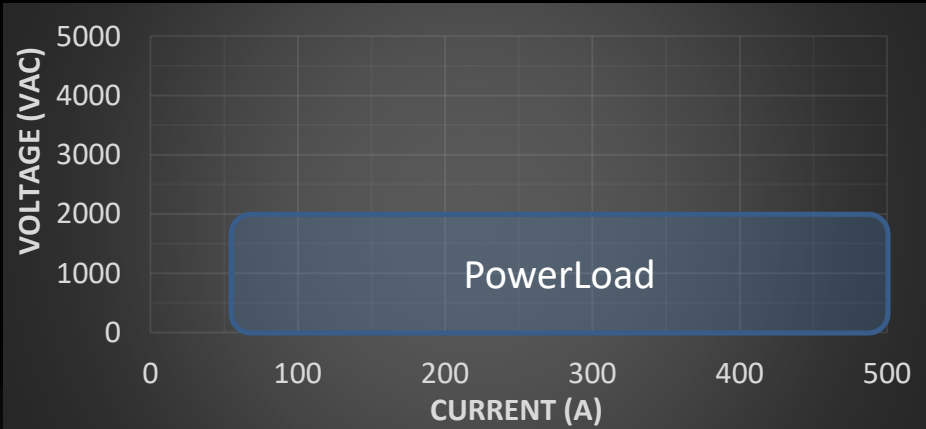


Distributed power system connectors for high voltage, high current, and high frequency applications

- High-vibe, high-temp design for the broad range of eVTOL power distribution applications including inverters, variable frequency drives, electronic speed control, and electric motor cabling
- Low-resistance contact system delivers low temperature rise under load
- Removable wire sealing grommet and wire separator allow for easy rear release of contacts and improved sealing of tape-wrapped wire



Series 972 PowerLoad Key Specifications



- Voltage: safely operates up to 2000 VAC
 - Rated at 15,000 ft
 - Meets IEC partial discharge requirements
 - Derated to account for high-frequency effects
- Wire Gauge Selection:
 - 8 AWG
 - 4 AWG
 - 2 AWG
 - 1/0
 - 2/0
 - 4/0
- Power-Specific Insert Arrangements:
 - Single Pole
 - 2-Pole (DC)
 - 3-Pole (3-Phase AC)
 - 4-Pole (Dual-DC, 3-Phase AC w/ dedicated neutral)

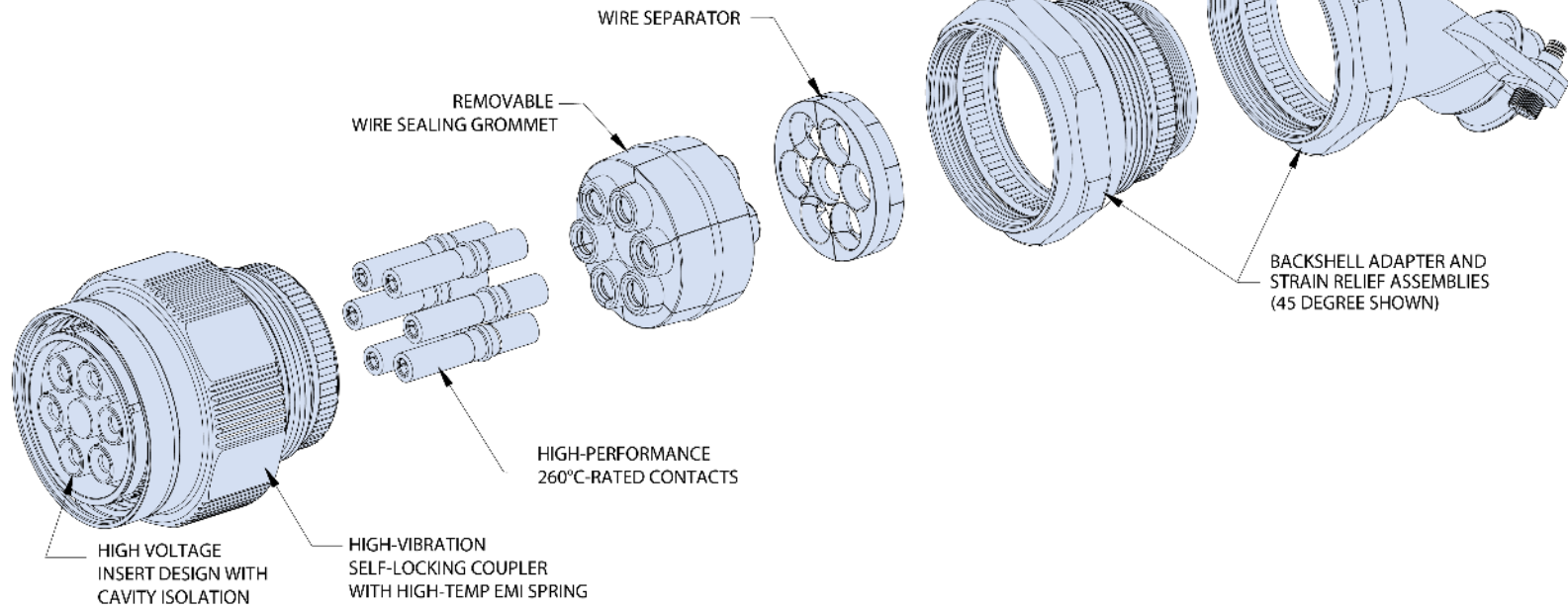
Series 972 PowerLoad Contact Arrangements

	8 AWG	4 AWG	2 AWG	1/0	2/0	4/0
20-1				1		
22-1					1	
22-2	2					
22-3	3					
24-1						1
24-4	4					
24-2		2				
28-2			2			
28-3			3			
28-4		4				
28-6	6					
32-2				2		
32-3				3		
32-4			4			
36-4				4		

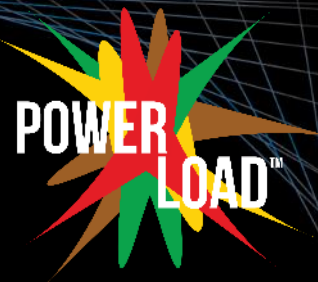
Series 972 PowerLoad Qualification Testing

Test Description	Test Specification	Result
Altitude Immersion	EIA-364-03	Pass
Backshell & Connector Durability	EIA-364-83	Pass
Backshell Coupling Strength	-	Pass
Backshell-To-Connector Shell Conductivity	EIA-364-83	Pass
Contact Engagement and Separation Forces	EIA-364-37	Pass
Contact Insertion and Removal Force	EIA-364-05	Pass
Contact Resistance	EIA-364-06	Pass
Contact Retention (100%)	EIA-364-29	Pass
Corrosion (Dynamic)	EIA-364-26	Pass
Coupling and Uncoupling Torque	EIA-364-114	Pass
Dielectric Withstanding Voltage at Sea Level	EIA-364-20	Pass
Firewall ²	EIA-364-45	Pass
Insert Retention	EIA-364-35	Pass
Insulation Resistance at Ambient Temperature	EIA-364-21	Pass
Maintenance Aging	EIA-364-24	Pass
Post Test Examination	-	Pass
Shell-To-Shell Conductivity	EIA-364-83	Pass
Shock	EIA-364-27	Pass
Temperature Cycling (thermal shock)	EIA-364-32	Pass
Vibration, Random	EIA-364-28	Pass
Vibration, Wing Tip	EIA-364-28	Pass
Visual, Mechanical, and Workmanship Inspection	ASTM B 571	Pass

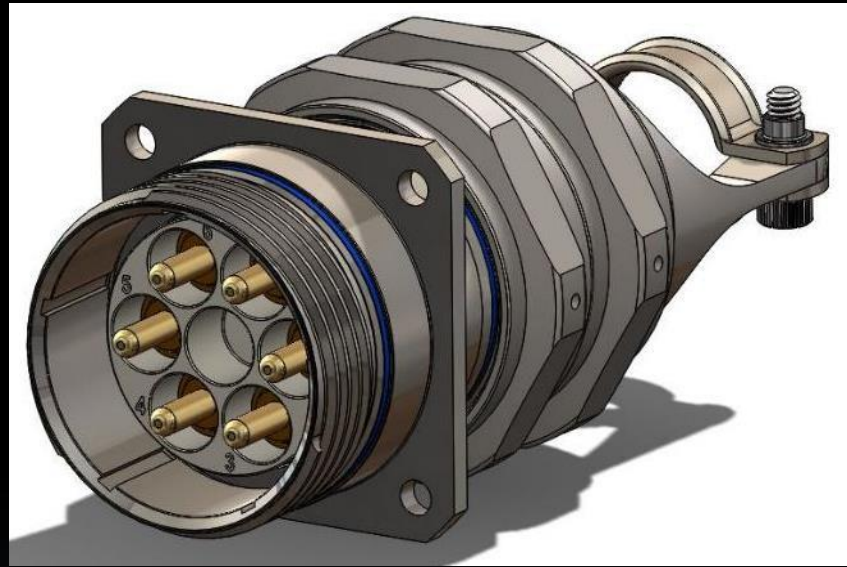
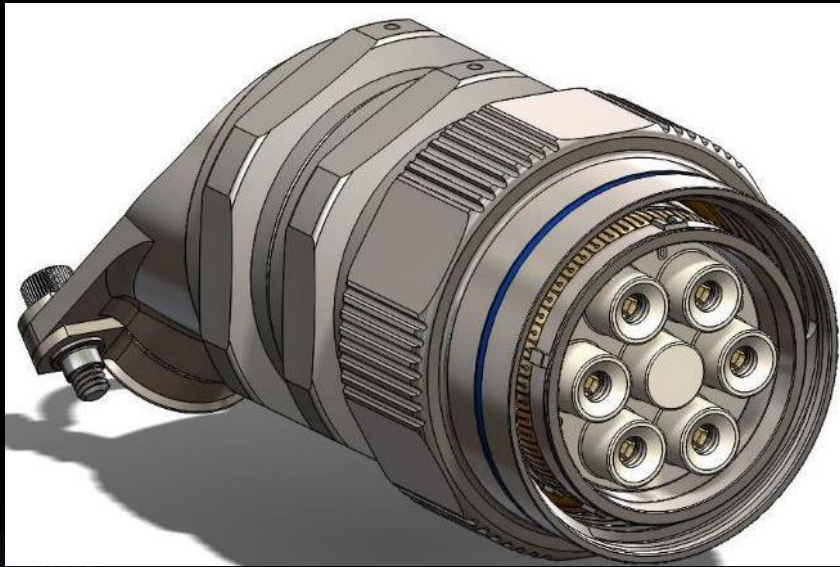
PowerLoad Plug: Exploded View



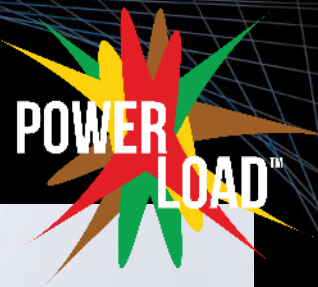
PowerLoad: Contact Mating Interface



- One-piece glass-reinforced PEEK insulator with contact cavity isolation



PowerLoad™ : Cable Management



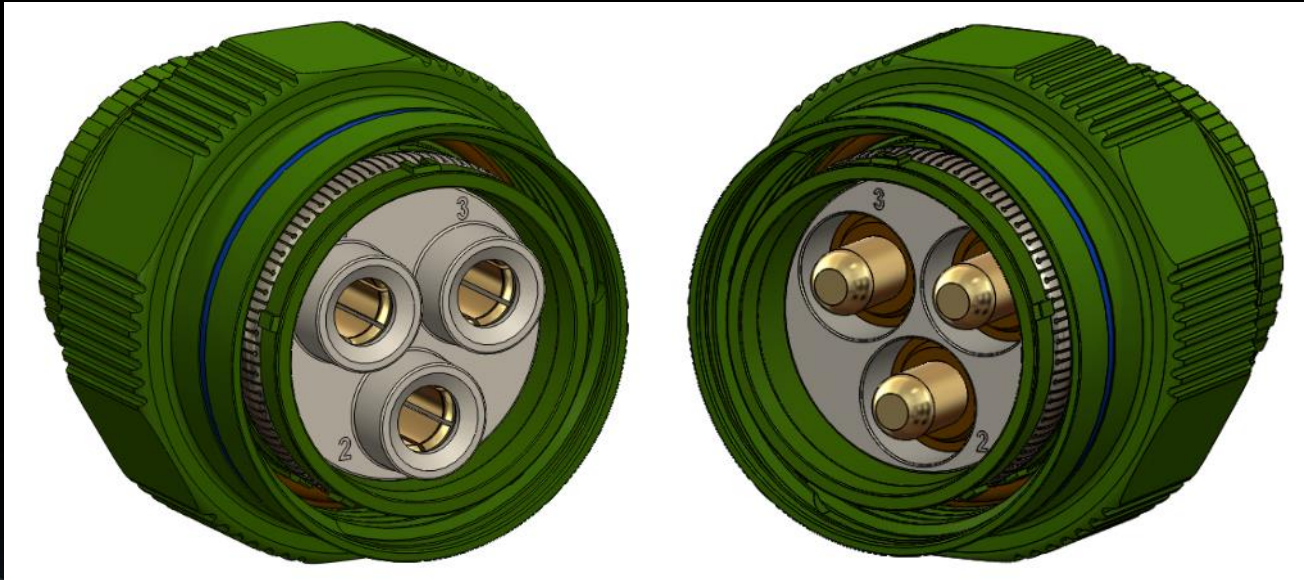
- Removable wire sealing grommet and wire organizer for improved tape-wrapped wire sealing and ease of contact removal



PowerLoad: Size #2 AWG contact system

POWER
LOAD™

- Design optimizes contact-to-wire termination step and weight reduction in power distribution cabling



PowerLoad™ : Configurations

Cable, panel mount, and bulkhead designs
in lightweight aluminum bodies and shells



Series 970 PowerTrip® High-Density Power Connector for Electrical Motor Applications



**POWER
TRIP®**



Glencair.

DESIGNER'S CHECKLIST	
✓	Triple-Start ACME Threads
✓	Watertight Rubber Seals
✓	High Shock and Vibration
✓	High Temperature
✓	EMI Protection
✓	High Durability
✓	Low Resistance
✓	Crimp, Snap-In Contacts
✓	No. 1/0, 4 and 8 AWG
✓	Improved Backshell Interface
✓	Nickel-PTFE Plating

Series 970 PowerTrip® Benefits



**POWER
TRIP®**

- Provides high power in the smallest form factor
- Improved mechanical, electrical, and environmental performance compared to automotive-grade
- Fast, easy mating 360° turn for full mating
- Reduced size and weight compared to conventional interconnect solutions
- LouverBand sockets for improved current
- Up to 500 connector mating cycles; 2000 mating cycle for contacts
- Splined backshell interface for improved backshell attachment and EMI shielding effectiveness
- Ratcheting coupling nut for secure mating
- Operating temperature -65° C to +200° C
- Hermetic and filter options available

Series 970 PowerTrip® Specifications



**POWER
TRIP®**

SPECIFICATIONS

Current Rating	Up to 400 A per contact
Dielectric Withstanding Voltage	2000 VAC
Insulation Resistance	5000 megohms minimum
Operating Temperature	-65° C. to +200° C.
Shock	300 G
Vibration	43 G at 175° per D38999
Shielding Effectiveness	65 dB minimum from 1GHz to 10GHz.
Durability	2000 mating cycles

MATERIALS AND FINISHES

Shells, Jam Nuts	Aluminum alloy, stainless steel or marine bronze
Contacts	High conductivity copper alloy, gold or silver-plated
Insulators	Glass-reinforced epoxy
Contact Retention Clip	Beryllium copper alloy
Seal, O-rings, Grommet	Fluorosilicone rubber
Spring	Nickel-plated beryllium copper

Series 970 PowerTrip®

Comparison to D38999 and 5015



**POWER
TRIP®**

	D38999	5015	PowerTrip™
Shell Size	9, 11, 13, 15, 17, 19, 21, 23, 25	8, 10, 12, 14, 16, 18, 20, 22, 24, 28, 32, 36, 40, 44, 48	18, 20, 24, 28, 32, 36, 40, 44
DWV (Sea Level)	SERVICE RATING M - 1300 SERVICE RATING N - 1000 SERVICE RATING I - 1800 SERVICE RATING II - 2300	INSTRUMENT - 1000 SERVICE RATING A - 2000 SERVICE RATING D - 2800 SERVICE RATING E - 3500 SERVICE RATING B - 4500 SERVICE RATING C - 7000	2000 VOLTS
Mating Cycle	500 CYCLES, EXCEPT 1500 CYCLES FOR CONTACT STYLE "H" OR "J"	100 CYCLES, EXCEPT 500 FOR AS34591 CONNECTORS	500 CYCLES

Series 970 PowerTrip®

The LouverBand Contact

- Generates multiple contact points between two conducting surfaces
- Provides consistent and stable force after thousands of mating cycles
- Lowers contact resistance and temperature
 - Higher ampacity
 - High-conductivity copper body
 - Beryllium copper spring



**POWER
TRIP®**

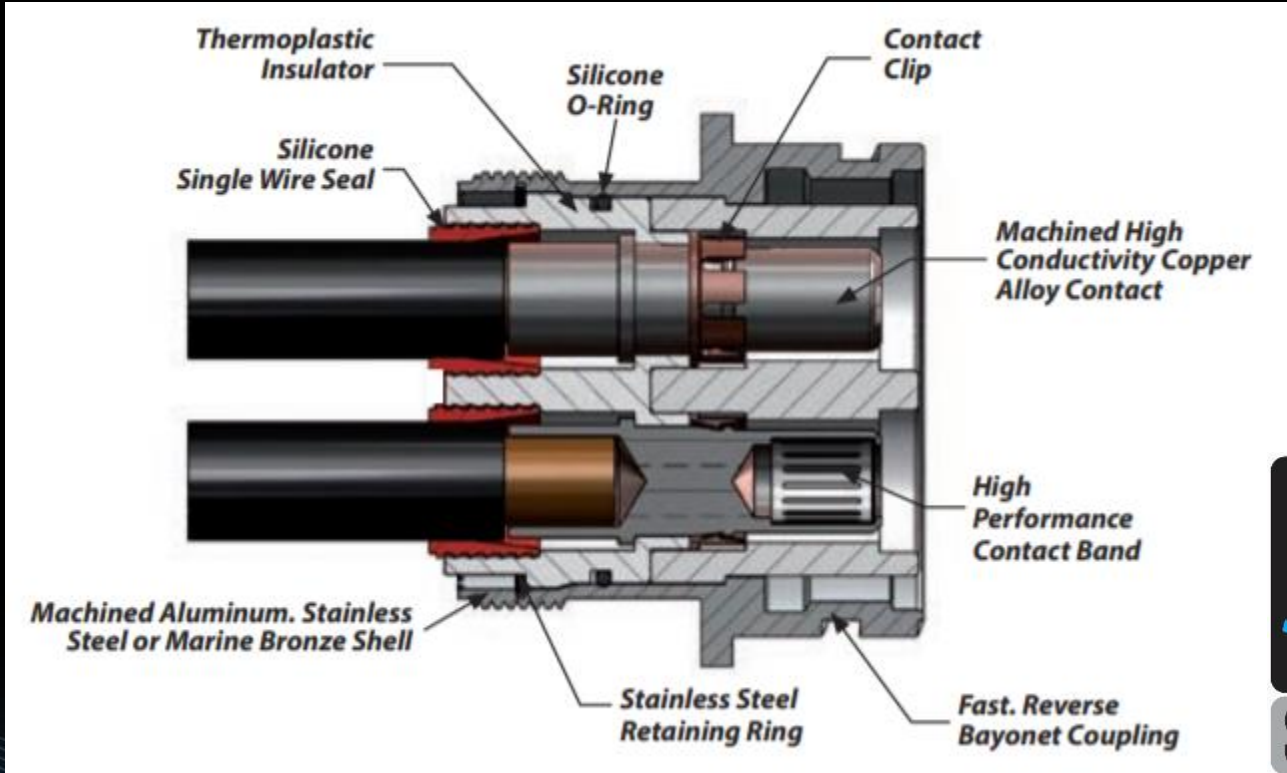
Series 921 Super ITS Bayonet-Lock

Rapid mate and demate reverse-bayonet power and signal connector

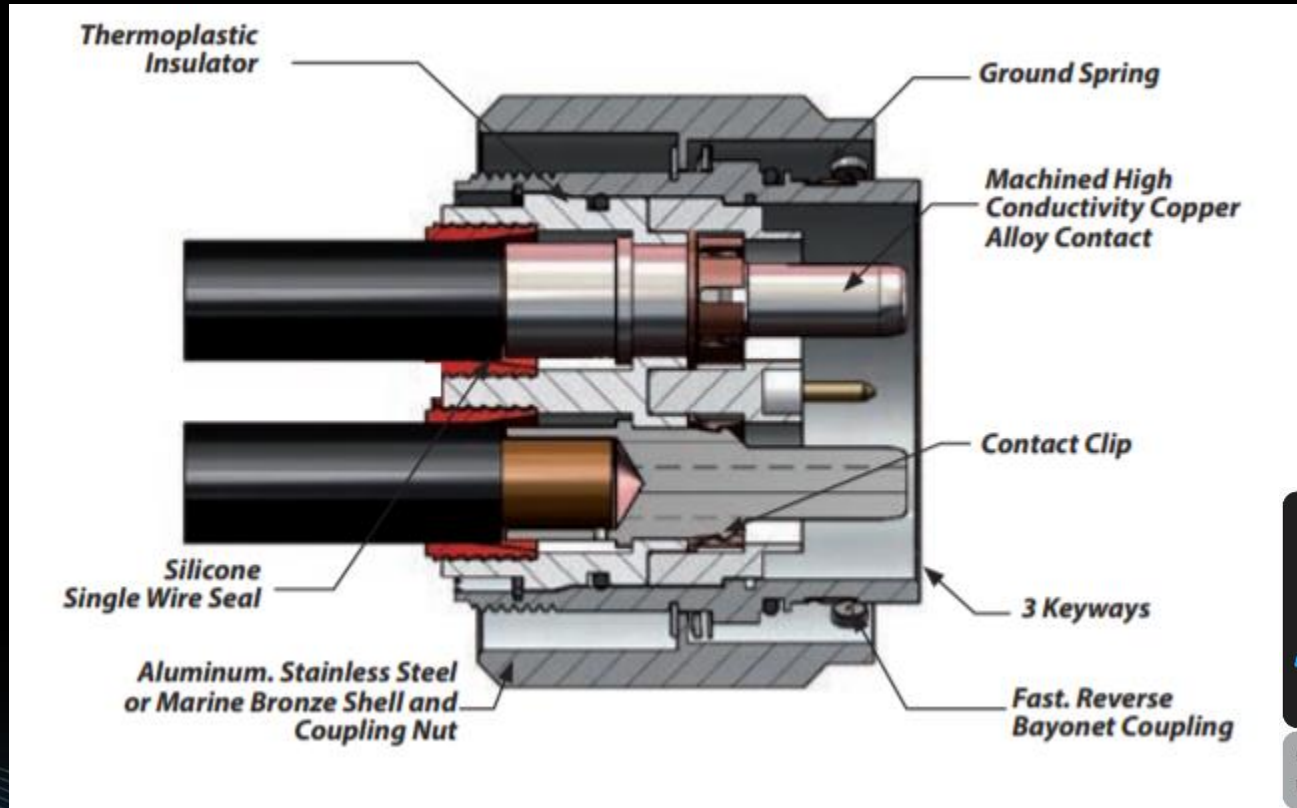
- 2,000 mating cycle precision reverse-bayonet with low-force contacts
- Rigid insert with mechanical contact retention
- High temperature range: -55° to +180°C
- High ampacity with new-generation cable support
- Front-release contacts with individual rear-end wire seal for rugged environmental performance to IP69K



Super ITS 921 Receptacle Cutaway View

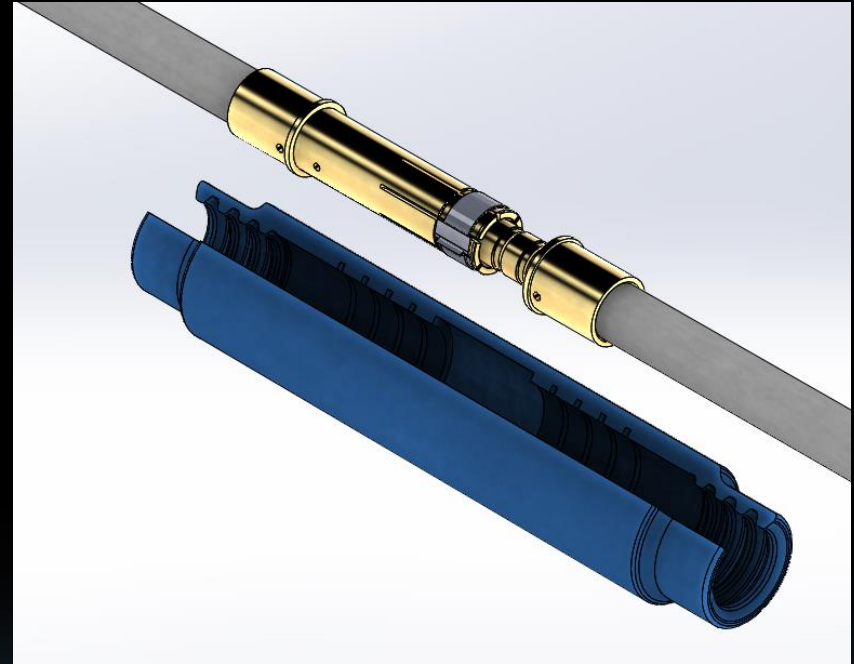


Super ITS 921 Plug Cutaway View



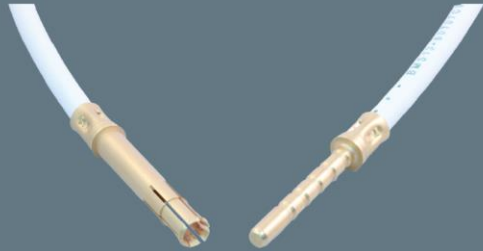
PowerBlock HV: Glenair Signature (Patented) High Current Power Feeder System

- Resolves cable lug misalignment issues
- Eliminates twisted cable (rotational) problems during assembly
- Integrated / compatible wire line technology used in combination with PowerLoad connectors

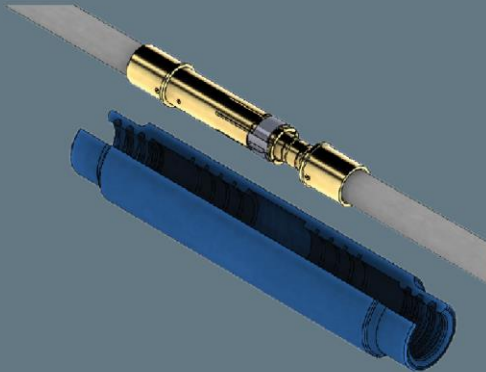


PowerBlock HV Power Feeder Architecture

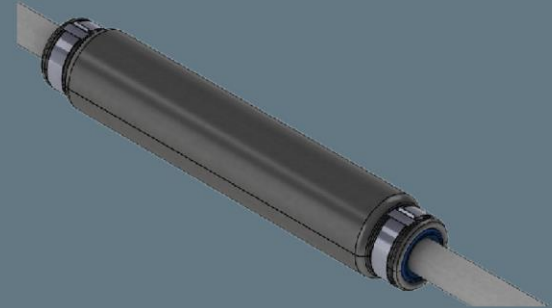
Contacts and termination zone environmental packaging



High-current power feeder contact and cable system



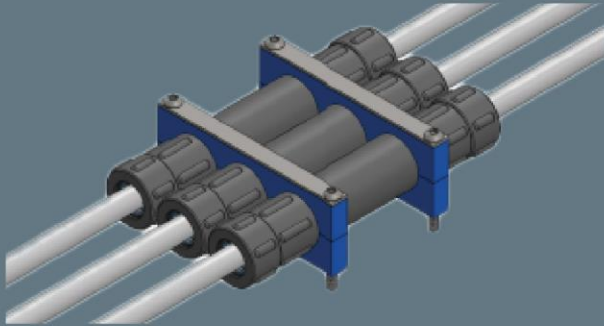
Shown with self-vulcanizing Duraelectric insulator...



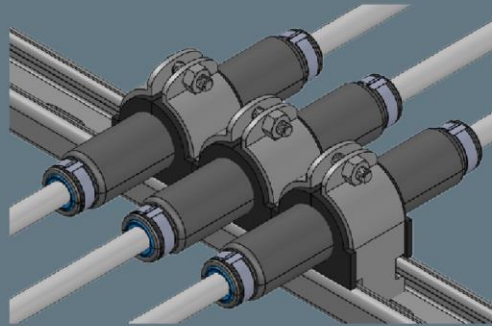
...and outer composite hard shell with EMI/RFI shield termination bands

PowerBlock HV Power Feeder Architecture

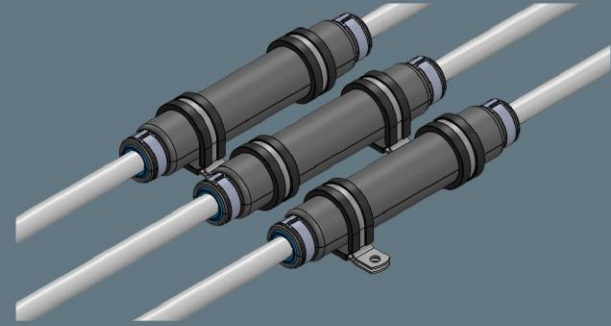
Line block mounting hardware options



Shown with line block mounting hardware...



...strut clamp mounting hardware...



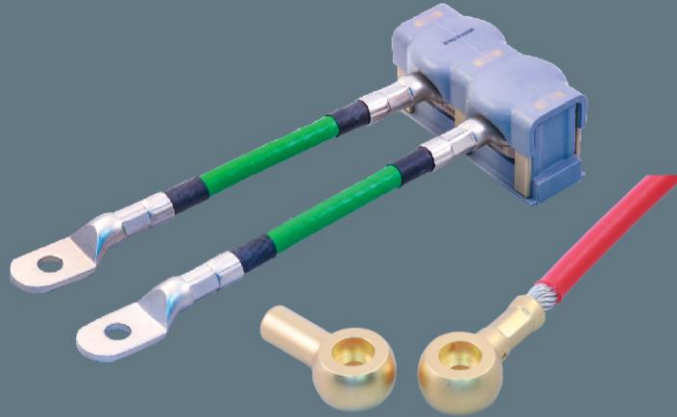
... and P-clamp mounting hardware

PowerBlock HV Power Feeder Architecture

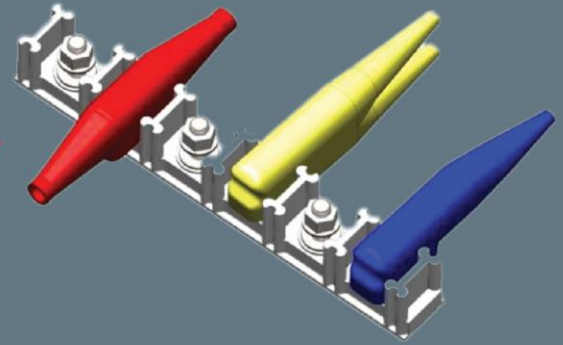
Terminal blocks, lugs, and hoods



Multiple designs of high-voltage terminal blocks with accommodation for PowerBlock HV lugs and/or standard lugs



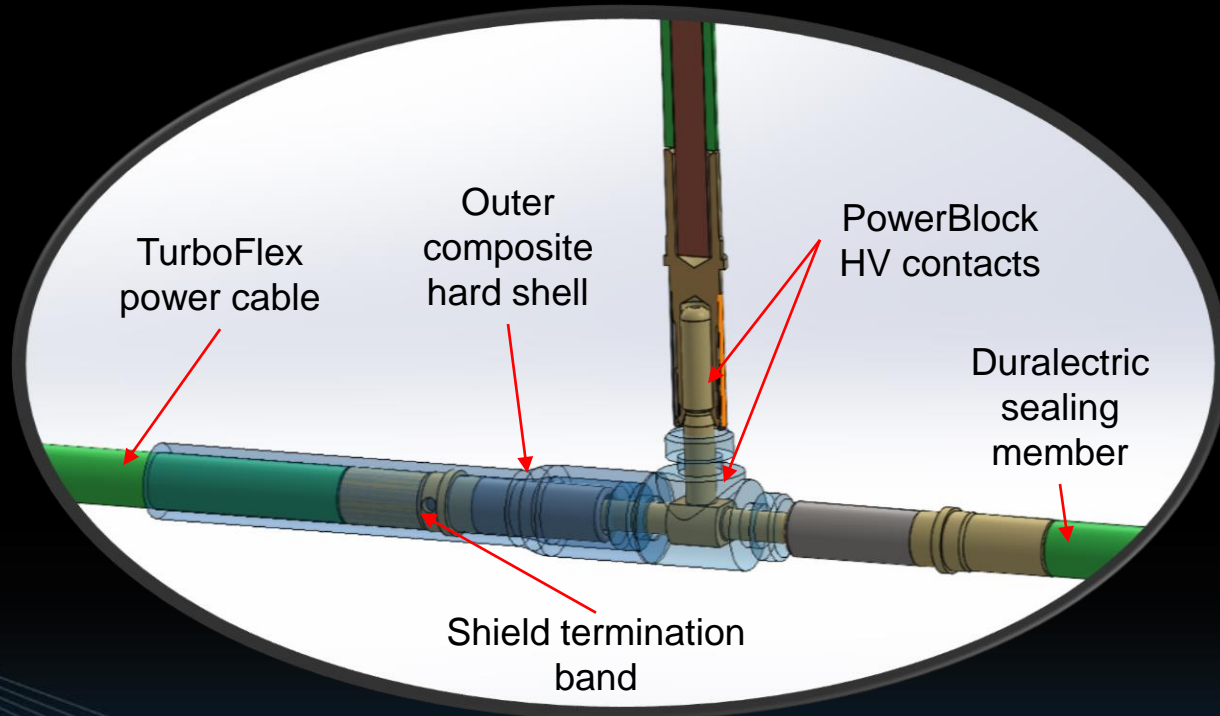
Conventional and PowerBlock HV terminal lugs



Color-coded terminal lug hoods made from high-performance Duraelectric material

PowerBlock HV Current Return Network (CRN)

Customer application optimized for composite aircraft



TurboFlex™ Ultra-Flexible High-Power Cable

The ultra-flexible and rugged power cable solution

- Rope-lay cable construction optimized for compatibility with PowerLoad connectors
- Jacketed with Glenair Duraelectric™
- 16 AWG to 450 MCM
- -60° to +260° C
- Abrasion resistant
- Standard and custom colors available

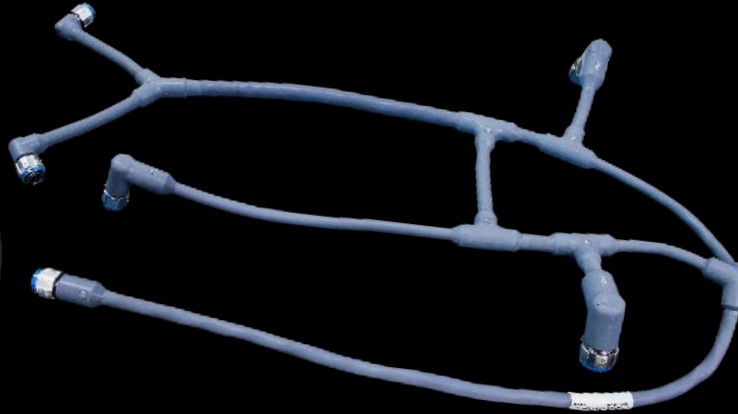


TurboFlex™ Flexible, Rugged Power Cable

Application examples



Main power
distribution



Control unit
assembly



SWAMP-zone
cabling

Turnkey Flex/PCB Interconnect Solution: Connectors, Flex, and Assembly All Under One Roof

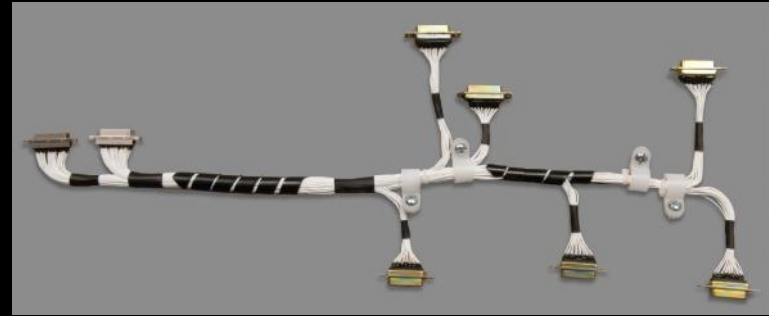


- Vertically-integrated capability for turnkey application in eVTOL electronic systems such as electronic speed controls
- In-house connector, board, and flex design and fabrication

Why Choose Flex?

Flex assembly vs. round wire assemblies

1. Less weight and bulk
2. Virtually eliminates wiring errors
3. Total installed cost is less
4. Tightly assembled electronic packages
5. Dynamic (Flex in application)
6. Direct in 3 different axis





Fast-action (No heat) shrink environmental sealing

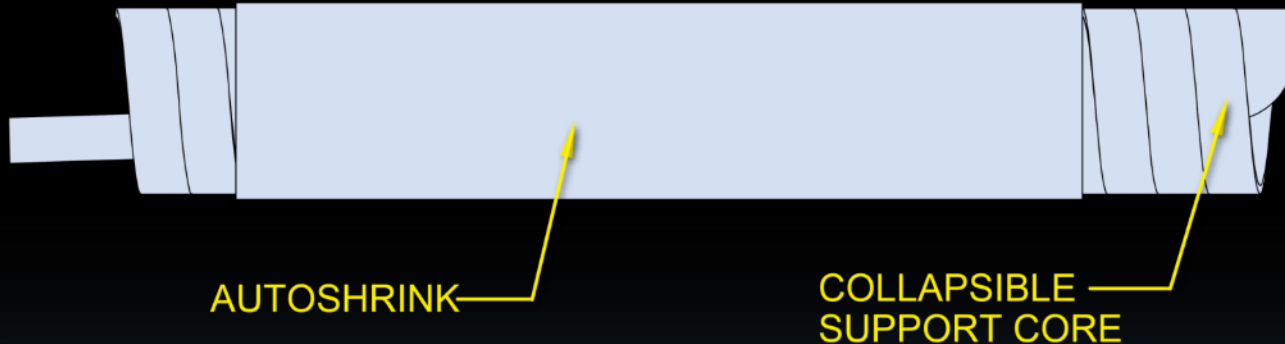


- Reliable, IP68 sealing
- Flexible and crack resistant compared to rigid heat shrink materials
- Fast installation – No heat gun!
- Sealing with or without adhesive
- -65°C to 225°C (300°C for Autoshrink T)
- Four available material types for high UV resistance, fluids/solvent resistance, and extreme temperature tolerance
- 3000 VAC rating

Autoshrink: How It Works

Memory-action material stretched over a removable core

- Position Autoshrink over termination or repair
- Remove collapsible support core



Autoshrink™ Applications



- Duralectric™ cable and conduit jacket repair
- Wire organization / color coding
- Insulation of splices or lugs
- Mechanical protection on clamp locations
- Molded boot shapes



Table II - AutoShrink Color Option

Code	Color	Reference
0	Black	FED-STD-595C; #17038
1	Desert Tan	FED-STD-595C; #33446
2	Red	FED-STD-595C; #11120
3	Orange	FED-STD-595C; #12300
4	Yellow	FED-STD-595C; #13591
5	Green	FED-STD-595C; #14193
6	Blue	FED-STD-595C; #15125
7	Purple	FED-STD-595C; #17142
8	Gray	FED-STD-595C; #26270
9	White	FED-STD-595C; #17875

SMALL FORM-FACTOR • LIGHTWEIGHT • PROVEN AEROSPACE PERFORMANCE



Lightweight Avionics, Flight Deck,
Actuator, and Sensor Connectors

NEXT-GENERATION SMALL FORM-FACTOR AEROSPACE-GRADE CONNECTOR



SERIES

806

MIL-AERO



SERIES 806 MIL-AERO
ULTRAMINIATURE CIRCULAR

Series 806 Mil-Aero

SERIES
806
MIL-AERO

Product Overview

- Significant size and weight savings
- High-density 22HD, 20HD, Size 8 Quadrax and EI Ochito, power, and high-frequency RF
- Environmental, PCB, hermetic, and EMI filtered versions fully supported
- Suitable for sensors, communications gear, flight navigation, and other avionics and flight deck systems
- Special versions with high-speed Quadrax and VersaLink contacts



High-availability
catalog solutions
and custom
designs

Series 806 Upgraded Environmental, Electrical, and Mechanical Performance



- Anti-decoupling technology particularly in small shell sizes
- “Top Hat” design for improved DWV
- Radial seals
- Triple-ripple grommet seals
- 200° C temp rating
- 1,000 mating cycle



The “Better Than QPL” D38999 Series from Glenair



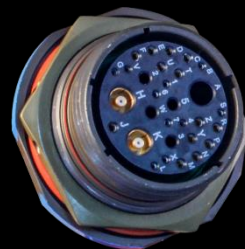
1500 Mating Cycle
Environmental



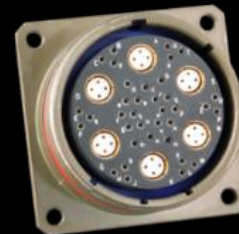
High-Vibration IAW Bell
Helicopter and Boeing



High-Pressure Pin and
Socket Hermetic



High-Frequency
RF / Microwave



High-Speed Ethernet,
DisplayPort, USB



Special PCB
Standoff Series



Connector Saver
Go-Betweens



Hermetic and
Environmental Feed-Thrus



Tight Tolerance
Fiber Optic



EMI/RFI Filters and TVS
Diode EMP Connectors



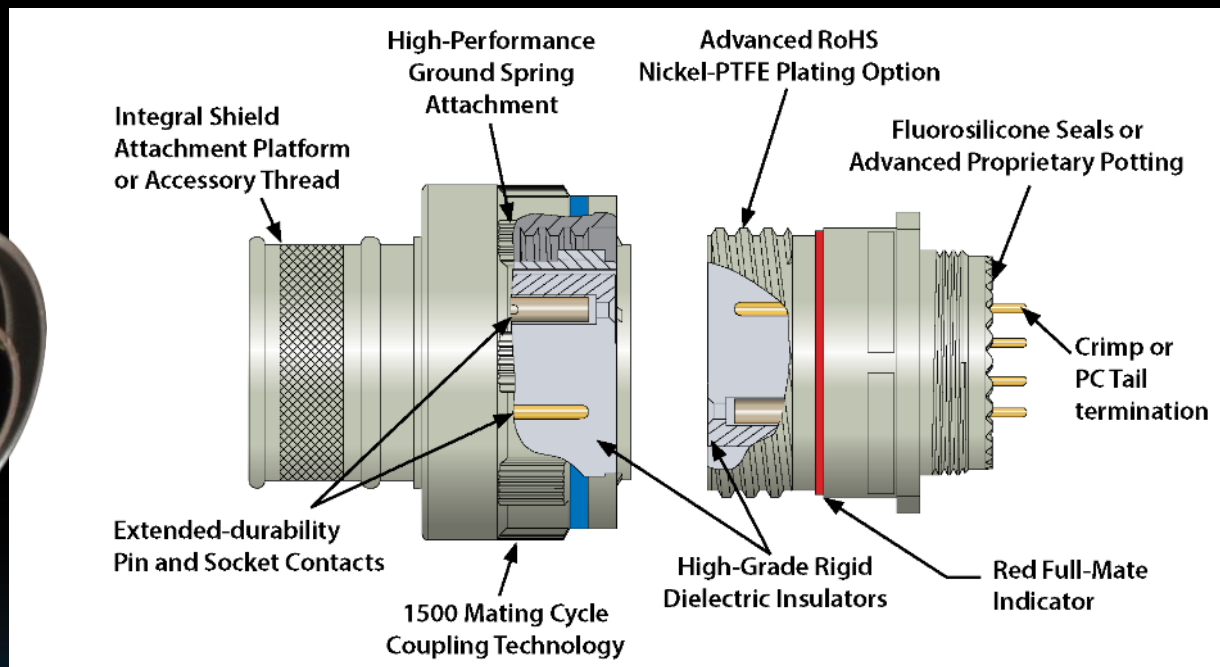
Advanced-performance “fly-by-wire” interconnect series



- Extended durability, low-resistance power and signal contacts, 1500 mating cycles
- High-vibration coupling technology:, IAW Boeing and Bell vibration specs
- Integrated shield banding porch
- Extensive PC tail offerings
- Ground spring equipped plug
- Standard pin/socket arrangements plus HD and shielded contact inserts
- IP68 sealing standard

SuperNine®

Outstanding vibration, EMC, and environmental performance



Series 791 Micro Miniature Rectangular

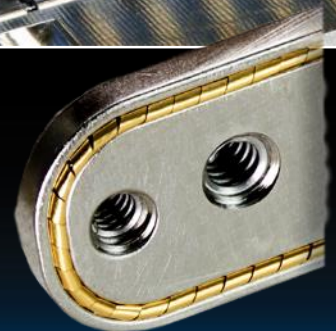
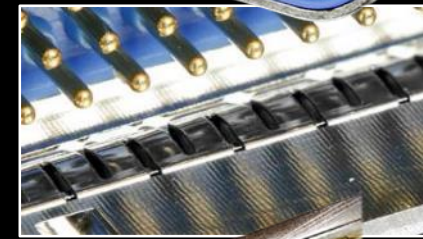
The scoop-proof rack-and-panel environmental connector for signal, power, and RF microwave applications

SERIES

791

SEVEN
NINETY-ONE

1. Dual-lobe polarized shell
2. Recessed pins (scoop proof)
3. 12 shell sizes, 37 tooled insert arrangements
4. Rugged mounting hardware
5. Protected ground spring
6. Panel O-ring equipped
7. Integral band platform



Series 792 High-Speed Datalink

The next-generation micro miniature rectangular for high-speed datalink applications

- Next-generation rear-release blind-mate rectangular
- Insert arrangements for 1 – 9 El Ochito[®] octaxial contacts
- Combo inserts accommodate #23 signal and/or power contacts
- Polarization key and ground spring options available
- Dual-lobe, scoop-proof interface



SERIES

792

SEVEN
NINETY-TWO

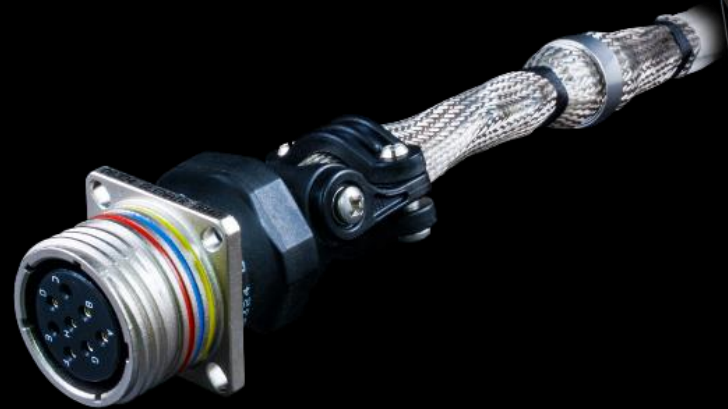
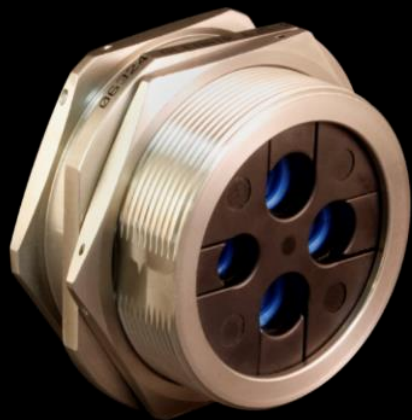
El Ochito[®] High-Density Octaxial Contact

Drop-in Size 8 octaxial contacts with outstanding high-speed signal integrity – now for both AWG#26 and AWG#24 wire!

- For 10Gb high-speed Ethernet, SuperSpeed USB 3.0, HDMI, DisplayPort, SATA
- 4 differential contact pairs, 90/100 Ohm Impedance
- Patented cross-talk isolation technology
- Snap-in, rear release, for keyed size 8 contact cavities in Series 806, SuperNine, and Series 792 connector packaging
- Integrated removal tool
- Repairable contact



SMALL FORM-FACTOR • LIGHTWEIGHT • PROVEN AEROSPACE PERFORMANCE



Wire and Cable Protection and
Management Technology

Lightweight Composite Connector Backshells for Cable Routing, Shield Termination, and Strain Relief



Composite Qwik-Snap Backshells with Hardware-Free Spring Latch Technology



Lightweight Composite Pressure Boundary Cable Feed-Thrus

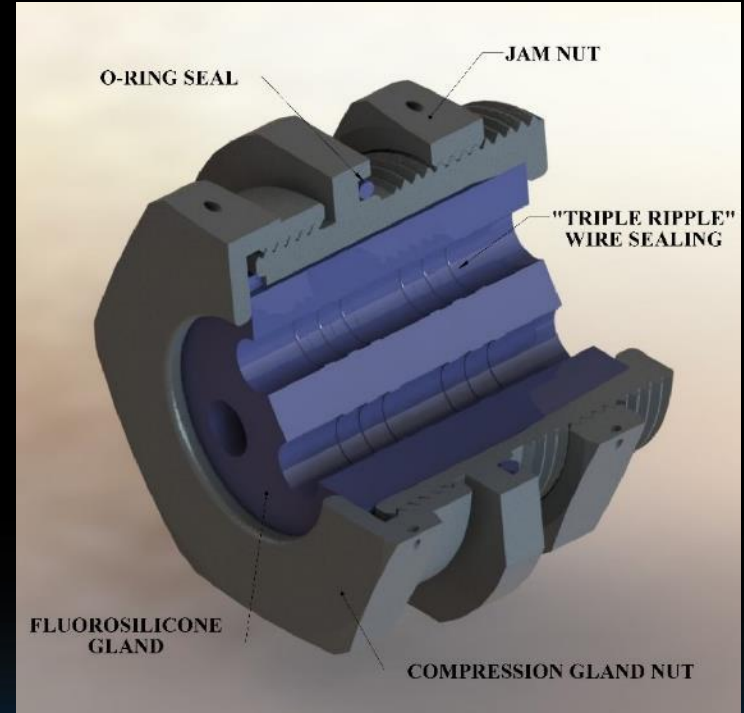
- High-grade engineering thermoplastic or machined metal
- Accommodation for 1 – 6 cables
- O-ring sealed panel and box mounting interface
- Conductive and non-conductive finish options



Pressure Boundary Feed-Thru Discrete Wire Sealing

Lightweight and simple solution for reliable sealing

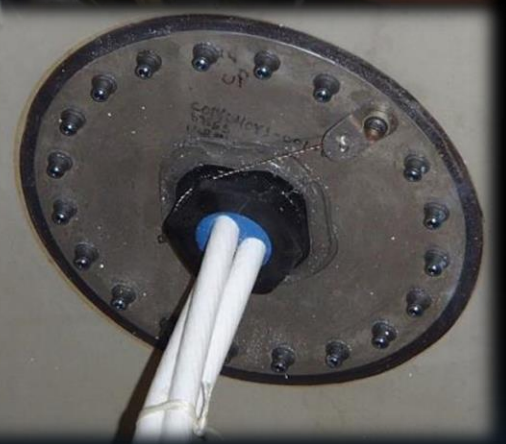
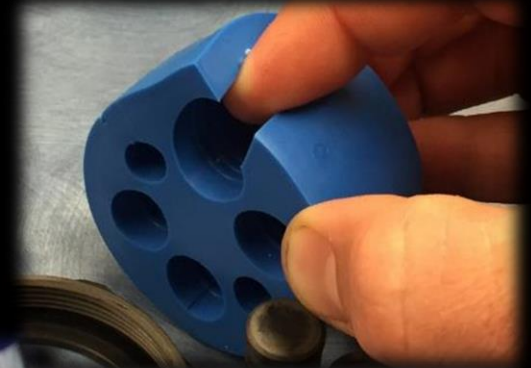
- Simple mechanics for a quick and easy installation
- Lightweight corrosion-resistant materials
- Dielectric housing for high-voltage insulation
- Gland seals designed for customer applications; fool proof sealing
- Self-healing grommet for mid cable insertion and repairability
- No potting required – immediate sealing



Pressure Boundary Feed-Thru Discrete Wire Sealing

Lightweight and Simple Solution for Reliable Sealing

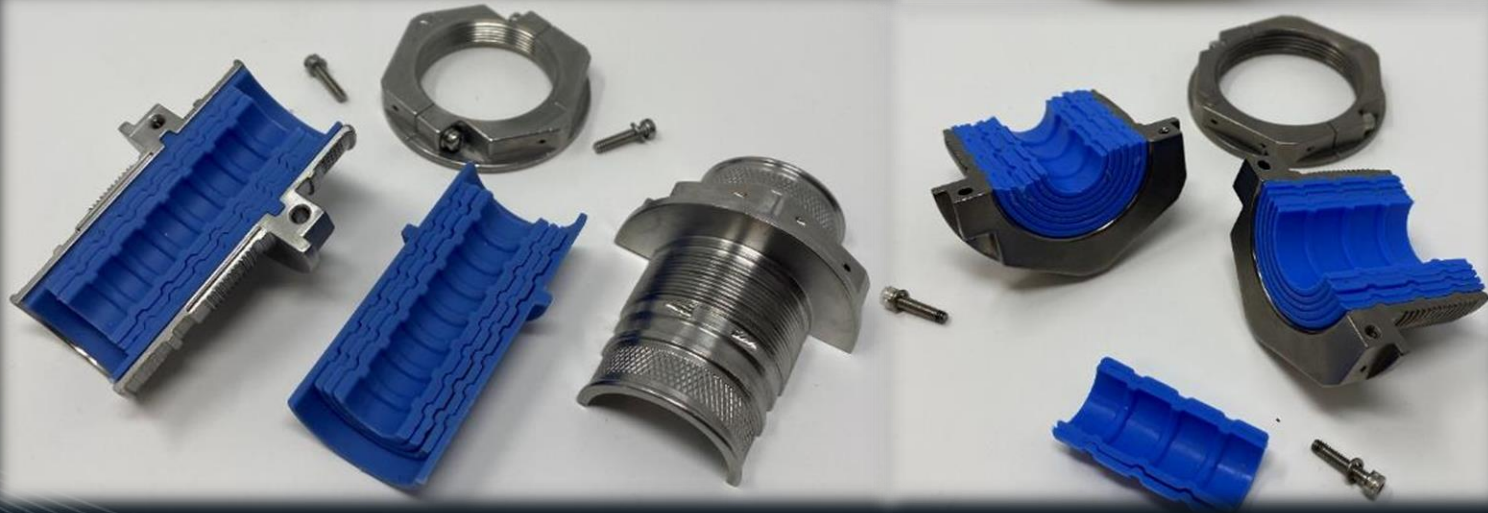
- Flight tested in heritage applications
- Adopted by dozens of aerospace platforms as primary feed through technology



Pressure Boundary Feed-Thrus

Split encapsulation for cable protection

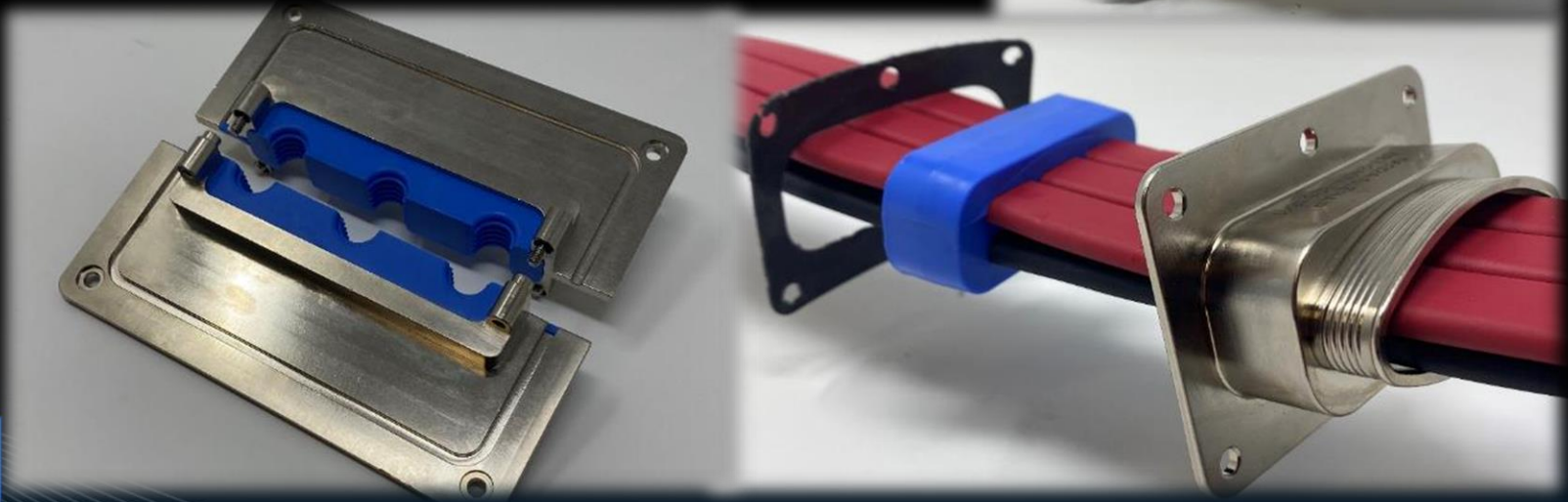
- Split shell for final assembly installation
- Peel away grommets give multiple layer protection and user defined internal diameter



Pressure Boundary Feed-Thrus

Custom designs for irregular cable and panel shapes

- Reworkable designs for ever changing industry standards
- Engineered to seal application at hand



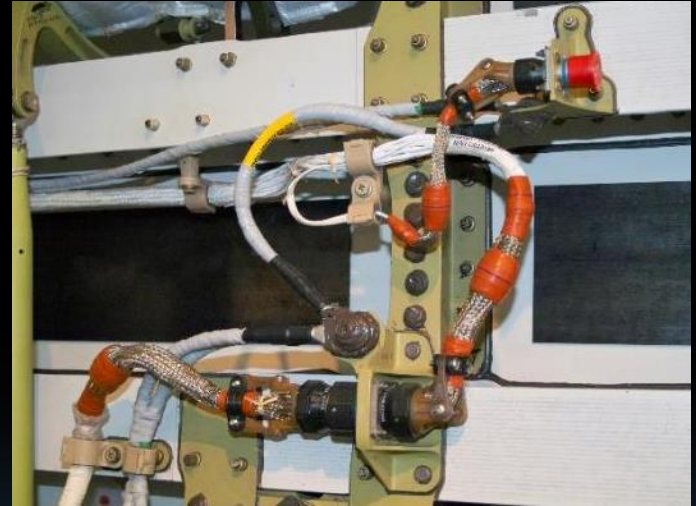
Swing-Arm Lightweight

Articulating Three-in-One Backshell

SWING ARM
ARTICULATING THREE-IN-ONE BACKSHELL
STAINLESS STEEL • ALUMINUM • COMPOSITE

The new industry standard for aircraft electrical wire interconnect system strain relief and shield termination

- The principal benefit is in the reduction of SKUs as the articulating form-factor may be modified for straight, 45°, and 90° cable routing



Swing-Arm Lightweight

Articulating Three-in-One Backshell Styles

The series is available as a standalone strain relief device, with drop-in EMI shield termination follower, or with integrated braided shield sock

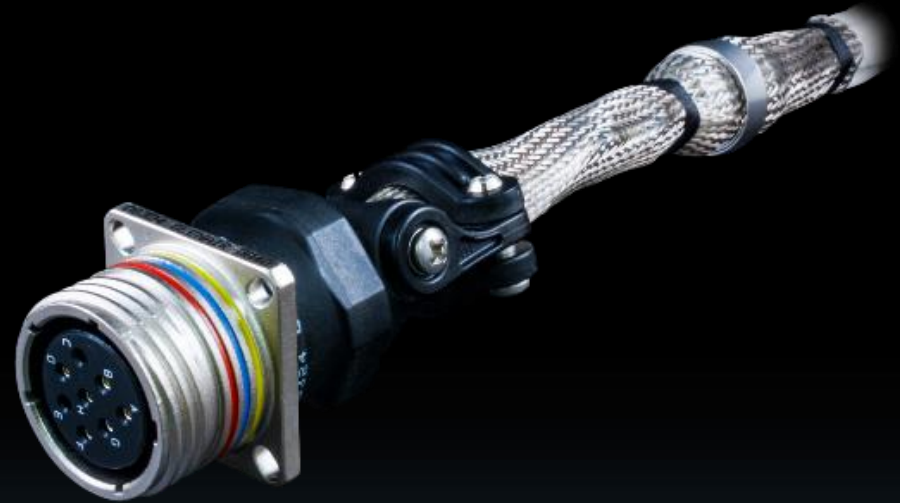
SWING ARM
ARTICULATING THREE-IN-ONE BACKSHELL
STAINLESS STEEL • ALUMINUM • COMPOSITE



Swing-Arm and Swing-Arm FLEX with Optional Integrated Shield Sock

Broad range of material types including lightweight microfilament ArmorLite and AmberStrand

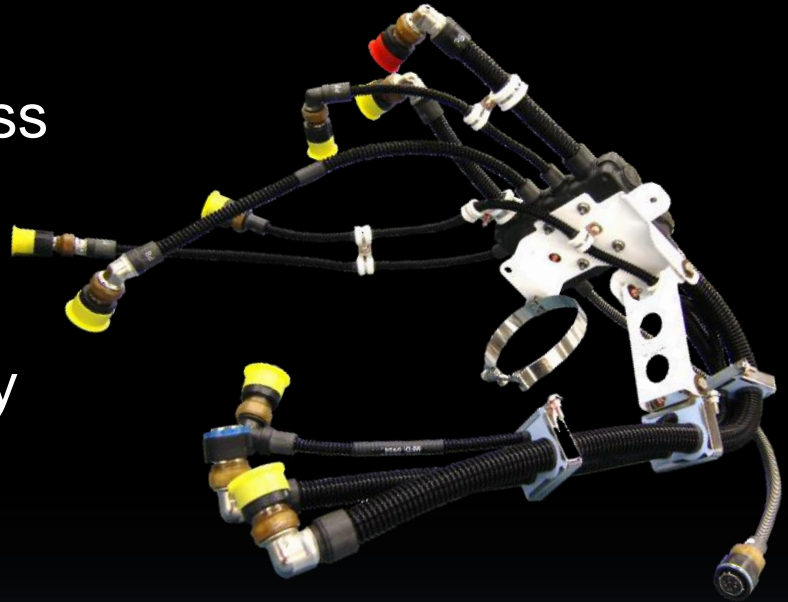
- Shifts the cable shield-to-backshell termination zone away from the connector and cable clamp for ease of assembly and repair



Conduit Wire Protection Systems

An alternative to jacketed cable assemblies with unique application advantages

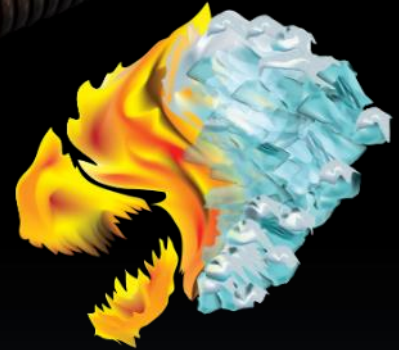
- Superior EMI shielding effectiveness
- Superior crush resistance
- Superior flexural modulus
- On-site installation / repair flexibility



Wire Protection Conduit for High-Temperature Applications

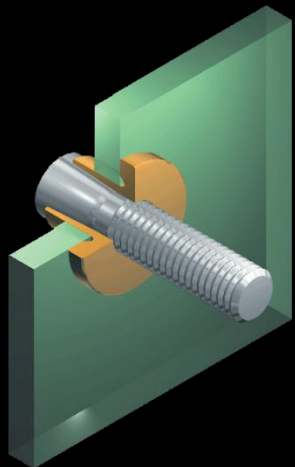
Wire protection adjacent to engines in hybrid air taxis

- Helical – compatible with threaded adapters
- 300°C continuous operating temperature
- Dimensions and bend radius per SAE-AS81914/9
- Vertical burn FAR 25.853 compliant
- Black, clear, orange, blue, yellow
- Available with high-temperature braid shield and/or jacket



ThermaRex™

SMALL FORM-FACTOR • LIGHTWEIGHT • PROVEN AEROSPACE PERFORMANCE



Shielding and Grounding Solutions for
Electromagnetic Compatibility (EMC)

GroundControl Earth Bond system

Grounding and return path system for conventional and composite aircraft

- Setting tools and studs for various materials and panel thicknesses
- Bi-laminar (copper core) earth bonds
- One-hand operation and ram retract mechanism actuated by release trigger



GroundControl Earth Bond system

Four-step procedure

1. Use extant hole, or drill per material type
2. Screw the bond into the nose of the tool
3. Repeatedly press the lever until you hear a clicking sound. Remove the tool
4. Attach the cable to the bond and tighten the nut



ARMORLITE

Microfilament EMI/RFI Shielding

Average 70+% lighter than standard metal EMI/RFI braid

- Lightweight / conductive metal-clad stainless steel microfilament braided shielding
- Provides abrasion resistance and EMI shielding at a fraction of the weight of standard metallic braid
- New stainless steel over copper core configuration available for superior conductivity and corrosion resistance



Glencair

ARMORLITE

Microfilament EMI/RFI Shielding

Performance advantages

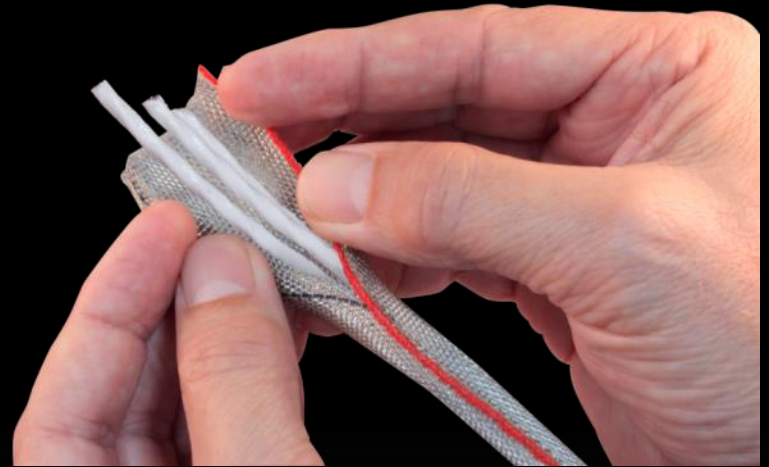
- Shields from 80dB to 40dB in 100Khz & 1Ghz
- Excellent optical braid coverage – min. 85-90%
- Excellent tensile strength @ -80°C to +200°C
- High flexure strength / flexibility
- Available with nickel or silver plating
- Meets limits of 1.0% max outgas test IAW ASTM-595-90 and 0.10% max. CVCM
- Meets lightning strike EIA-364-75 specification at 3Kva, 6Kva & 10Kva thru 25Kva wave form 5B
- Excellent abrasion and FAR burn resistance



MasterWrap™ Wraparound Shielding

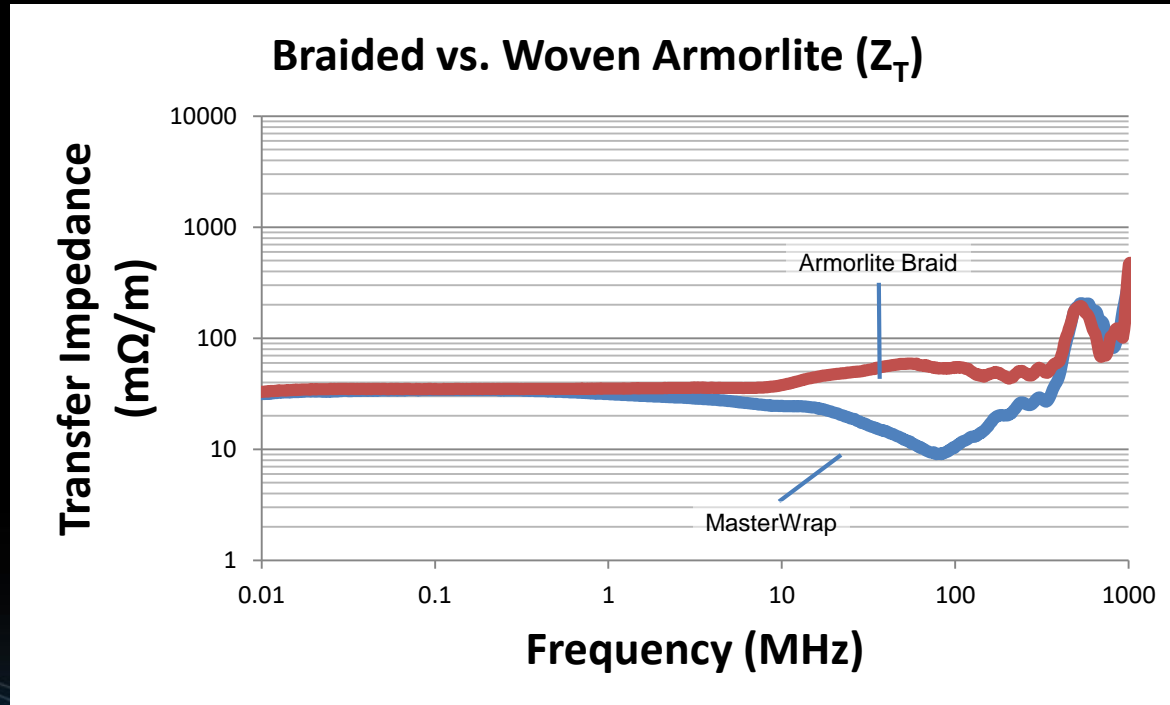
Lightweight, side-entry cable wrap
with **ARMORLITE** or Nomex® materials

- The faster, easier-to-apply cable covering for EMI/RFI shielding and abrasion protection applications
- Lightweight, side entry, conductive and non-conductive materials available



MasterWrap™ EMI Performance

No compromise compared to tubular braided product



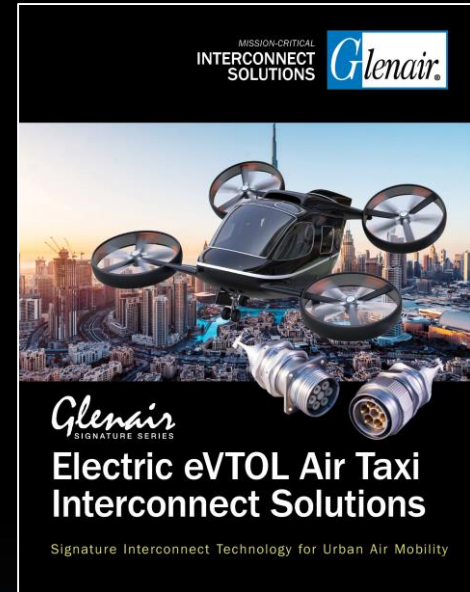
ArmorLite Ground Straps and HSTs for Electrical Discharge

Long runs of shielded, overbraided EWIS harnesses require periodic grounding of entire assembly for ESD and lightning strike



Additional Urban Air Mobility Collateral

Available whitepapers and technology overviews





Interconnect Solutions for Distributed Power eVTOL Applications