



LEMO

Unmanned Vehicles

1946

75 YEARS ● 75 ANS
1946-2021



LEMO Manufacturing and R&D Offices





USA



GERMANY



UNITED KINGDOM



Low Voltage



High Voltage



DIN & CECC EU Standard



Harsh Environment



HDTV / SMPTE – Fiber Optic



Media Converters



Underwater



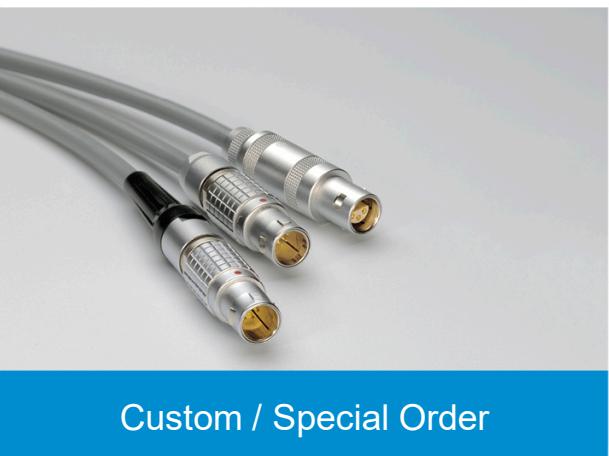
Coaxial / Triaxial



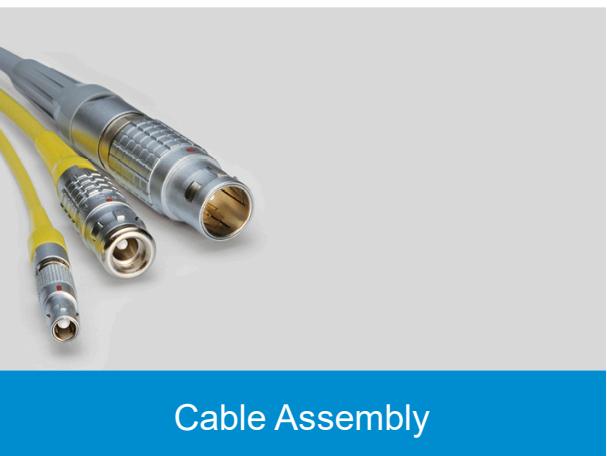
Plastic



Miniature



Custom / Special Order



Cable Assembly

HOW FAR DO LEMO CONNECTORS REACH?

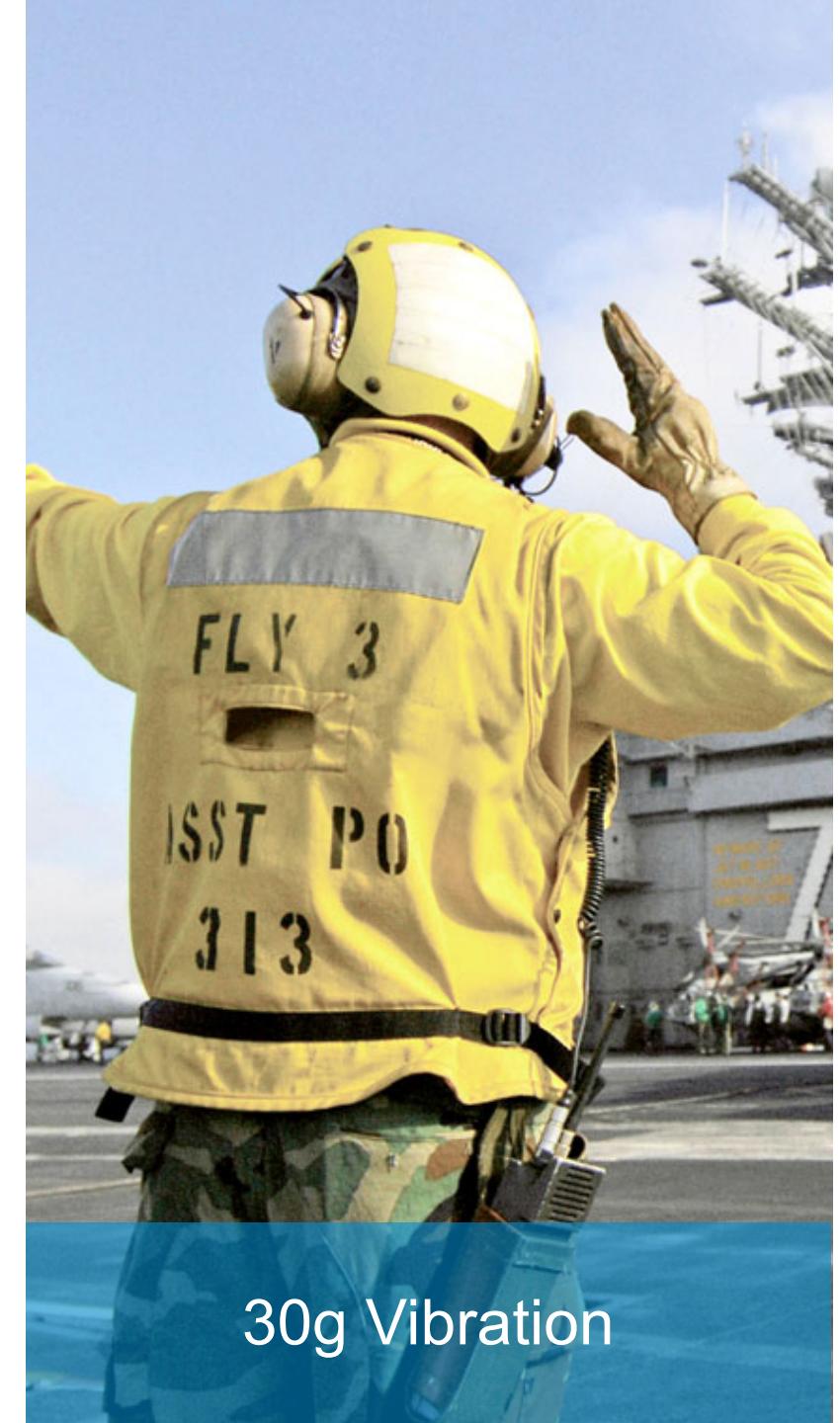




10^{-7} mbar.l/sec
Air Leakage



Harsh Environment
-55°C Outside Temp.

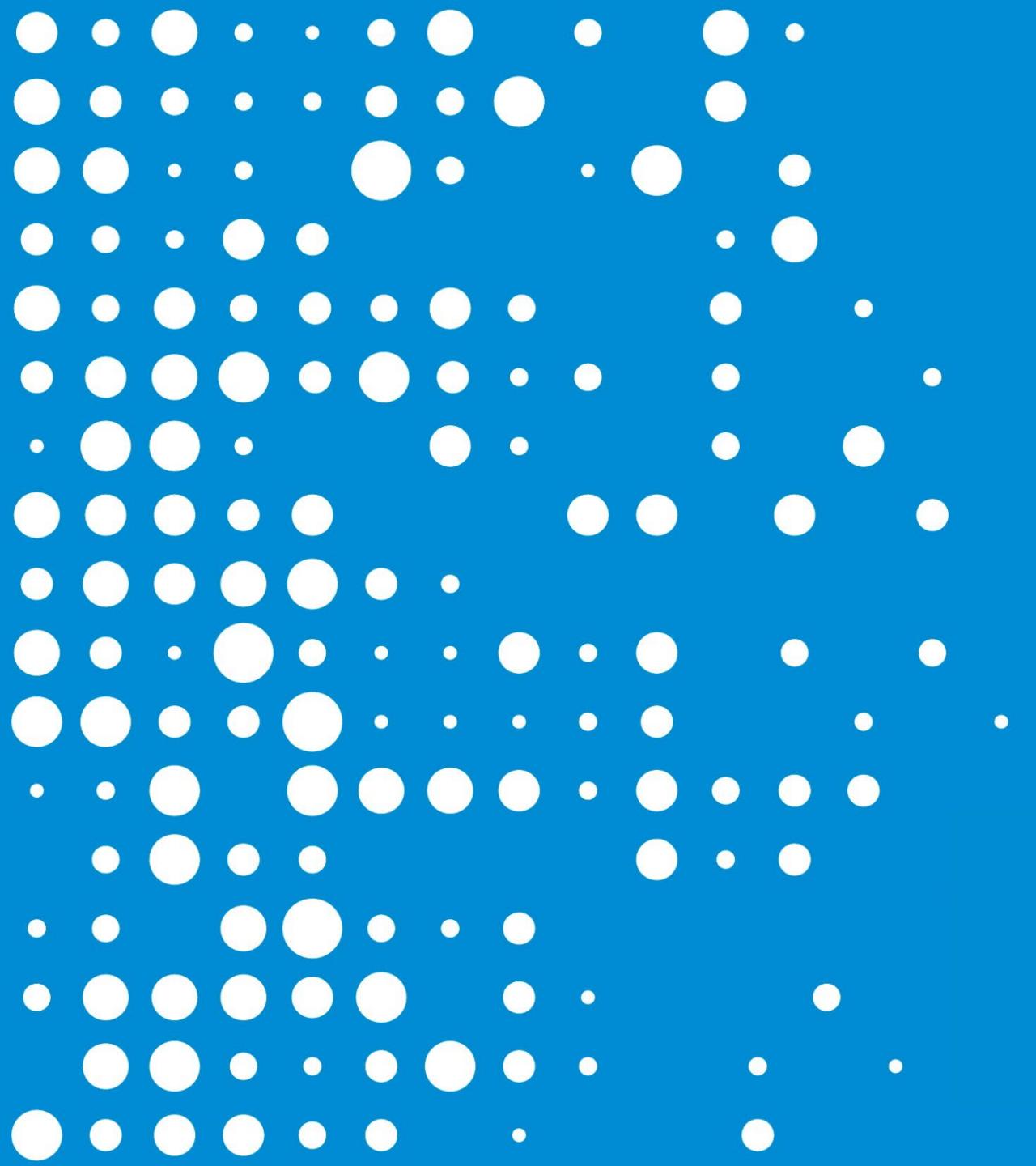


30g Vibration



LEMO Family of Products





UxV Applications

- Quality
- Expertise
- One-stop Shop
- Custom Design Capabilities

Applications where systems are frequently set up and torn down

Where connectors used externally on products

Critical applications where connector has to work every time

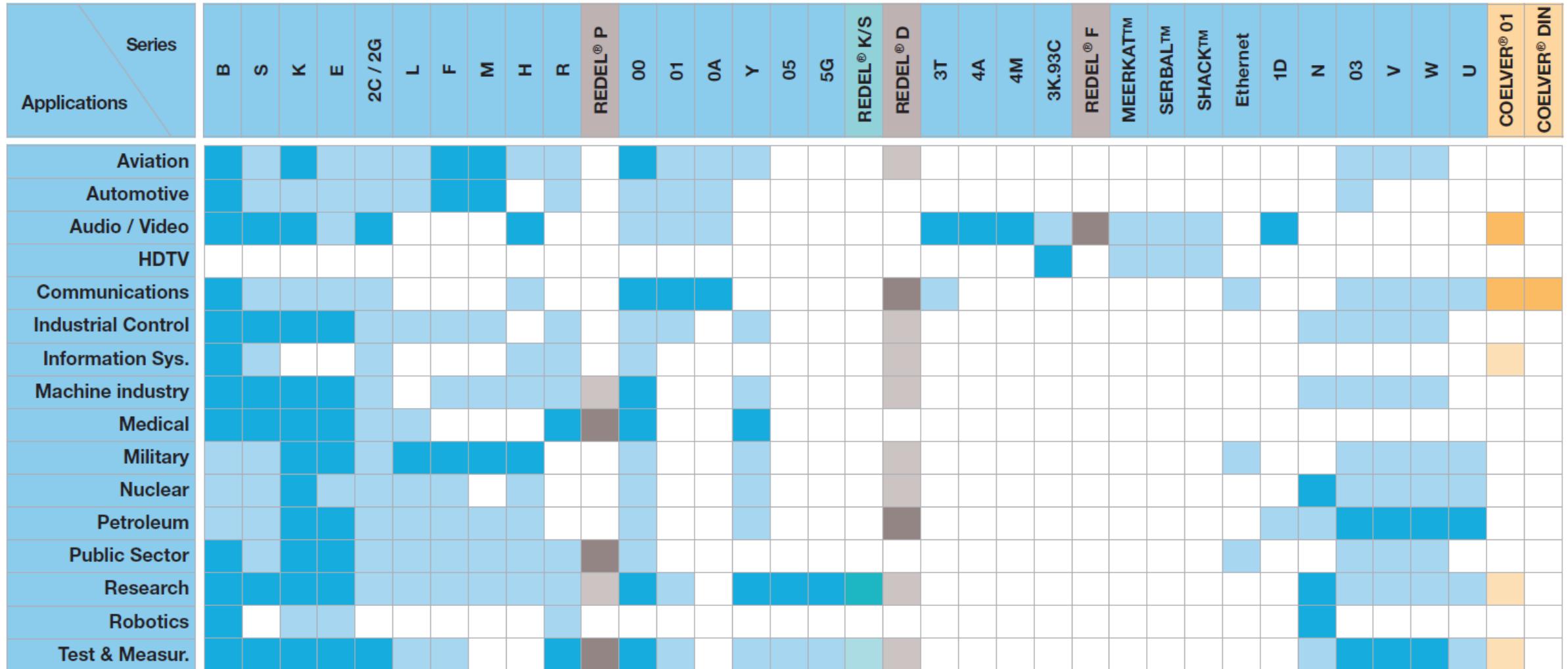
Connector Selection Guide



The Connector Selection Guide
features the 36+ Series
Manufactured by LEMO

Most Popular by Market Segment

Most frequently used in darker color



Contacts Available within Series

Series Contact type	B	S	K	E	2C / 2G	L	F	M	H	R	REDEL® P	00	01	0A	Y	05	5G	REDEL® K/S	REDEL® D	3T	4A	4M	3K.93C	REDEL® F	MEERKATTM	SERBALTM	SHACKTM	Ethernet	1D	N	03	V	W	U	COELVER® 01	COELVER® DIN
Unipole	■																																			
Multipole	■	■	■	■																																
Coaxial 50 Ω	■																																			
Coaxial 75 Ω	■																																			
Multi Coaxial	■																																			
Mixed Coax + LV	■																																			
Triaxial 50 Ω	■																																			
Triaxial 75 Ω	■																																			
Mixed Triax + LV	■																																			
Quadrax	■																																			
High Voltage	■																																			
Multi High Voltage	■																																			
Mixed HV + LV	■																																			
Fibre Optic	■																																			
Multi Fibre Optic	■																																			
Mixed FO + LV	■																																			
Thermocouple	■																																			
Fluidic	■																																			
Multi Fluidic	■																																			
Mixed Fluidic + LV	■																																			

UxV Applications

LEMO's quality and unique features can improve UxV systems

- Size & Weight Reduction
- Mating Cycle Life
- Reliability
- Customization



Main Features

- Ratchet Coupling
- Triple Start Threads
- Compact & Lightweight Aluminum
- High Density: 2-114 contacts
- IP68 Water Resistance
- Anthracite Nickel-plated

Benefits

- Compact & High Density
- High Shock/Vibration Resistance
- Deep Water Resistant (2m to 15hr)
- Fuel & Oil Resistant



Main Features

- Push-pull for Easy Mating
- High Density Multi-contact
- Hybrid Configurations:
 - LV + Coax
 - LV + HV
 - LV + fluidic/pneumatic
- IP50

Benefits

- Durable Chrome-plated Brass
- High Mating Cycles 5,000+



Main Features

- Push-Pull for Easy Mating
- 2-64 Contacts
- Hybrid Configurations:
 - LV + Coax, HV, fluidic/pneumatic
- IP66 / IP68 Water Resistance
- Triple-Walled Shielding

Benefits

- Water & Corrosion Resistance
- Durable Chrome-plated Brass
- 1,000+ hours Salt Fog
- High Mating Cycles 5,000+



Main Features

- Compact & Lightweight Aluminum
- Push-Pull for Easy Mating
- 2-68 Contacts
- IP67 Water Resistance
- O-rings & Gaskets withstand Petroleum Environments
- Anthracite Nickel-plated

Benefits

- Compact & High Density
- High Shock/Vibration Resistance
- Deep Water Resistance (2m to 15hr)
- Fuel & Oil Resistance



Main Features

- Push-Pull for Easy Mating
- Miniature Sizes: 0T-3T
- 2-32 Contacts
- IP68 Water Resistance
- Standard Chrome-plated Shell
- Black Chrome-plated Option (seen here)
- Black Plastic Shell Option

Benefits

- Break-away / Quick-release
- 1,000+ hours Salt Fog
- High Mating Cycles 3,000+
- Tight Finger Space Operation
- Unique Pin Configurations & Hybrids
- Plug Mates with B Series Receptacles



Main Features

- 8 in 1 Right-Angle Plug
- IP68 (B & T series)
- Cable Clarity

Benefits

- Cable Management
- Reduce operating failures caused by stressed cables



HALO LED Receptacles

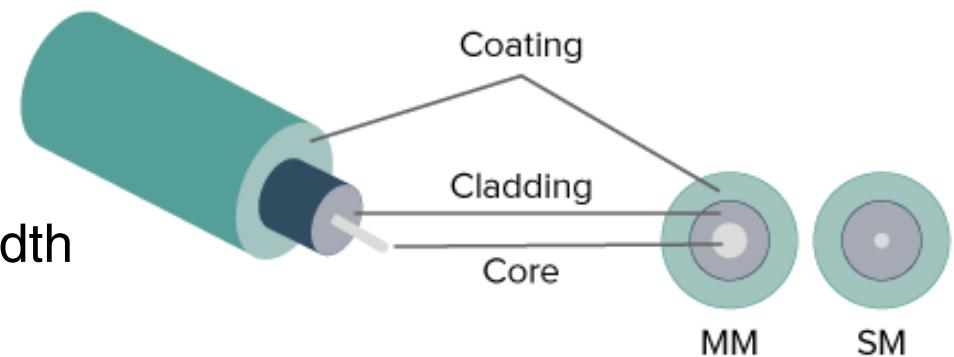
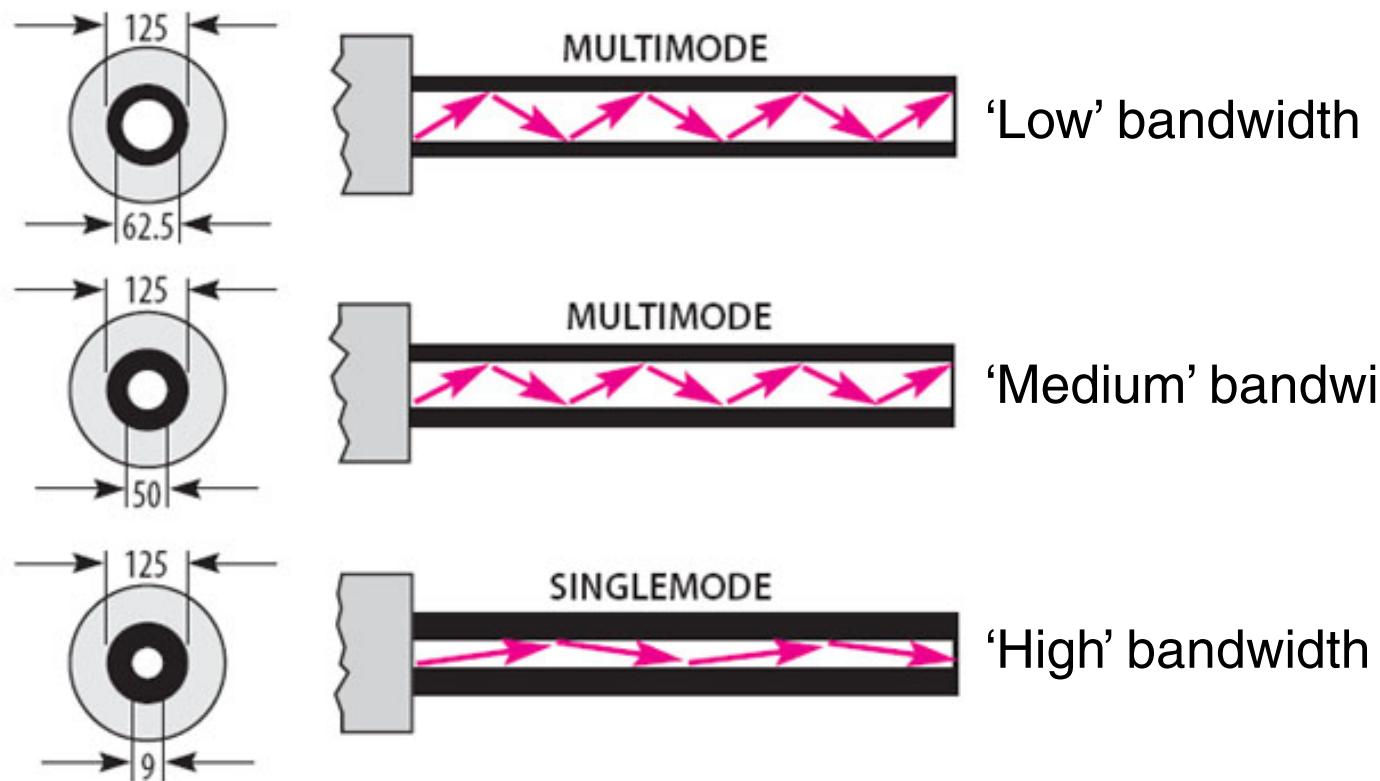
Main Features

- RGB LED Lighted Flange
- 3 Options
 - LED Flange (8 surrounding)
 - Single Standby LED Flange
 - Narrow LED Flange
- PWM (Pulse Width Modulation) Power Control to change brightness and create any color
- IP50
- Fits 0B, 1B, 2B plugs

Benefits

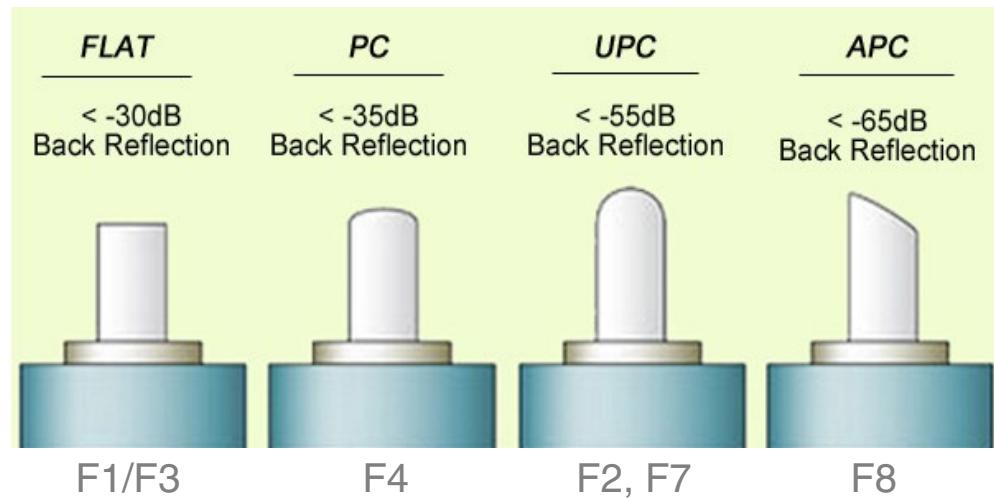
- IAC (Intelligent Active Connector)
- Displays Connection Status





Main Features

- 2.0mm Fiber Contact allows for smaller housings. (Standard is 2.5mm)
- Ruggedized watertight single fiber connector (see right)
- Hybrid Configurations:
FO + LV, HV, Pneumatic/Fluidic



High Speed Connectors

Main Features

- CAT 6A (4 twisted pair)
- SPE (Single Pair Ethernet)
- Ruggedized Options
 - M = Ratchet Coupling
 - T = Push-Pull Coupling
- USB Form Factor



UAV (Unmanned Aerial Vehicles)

Drones – AG (Agriculture)

Drones – Military Surveillance

Air Taxis

UGV (Unmanned Ground Vehicles)

Driverless Cars & Trucks

Military - Platoons

Military - Mine Clearers

USV (Unmanned Surface Vehicles)

Hydrographic Survey & Mapping

Oceanographic Research

Maritime Missions

UUV (Unmanned Underwater Vehicles)

Mapping

Marine Research

Oil & Gas Cleanup

Arcturus UAV™ – VTOL* UAV M & F Series (Drone Controls & Fuselage)



* Vertical Take Off and Landing

CHI Aviation, Resolute Eagle – VTOL* UAV

M, F Series: Drone Controls & Sensors

B Series: Ground Control



* Vertical Take Off and Landing

General Atomics Aeronautical – Multi-Mission Remotely Piloted Aircraft B Series (Remote Control Consoles)



Boeing, Insitu – ScanEagle® 3 UAV
M & F Series (Controls & Communications)



Aurora Flight Sciences* - eVTOL** Autonomous PAV (Passenger Air Vehicle) B, M & S Series



* Owned by Boeing

** Electric Vertical Take Off and Landing

Northwest UAV – Drone Propulsion & Auto Pilot Systems M & F Series



Freefly Systems Alta X – Quadcopter Camera Drone B Series



SHOTOVER Systems (Churchill Navigation) ION – Geospatial Imaging M Series



Near Earth Autonomy – 3D Sensor Technology B & M Series

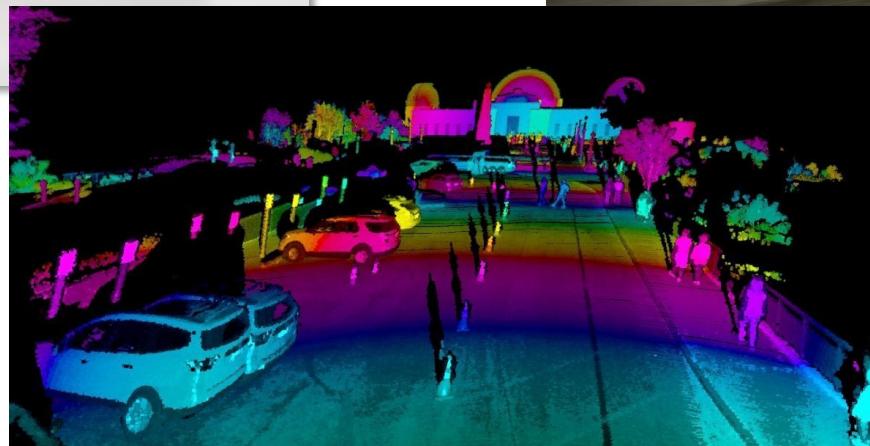


Aurora Innovations – Automotive Sensor & LiDAR Technology

T Series: SPE (Single Pair Ethernet)



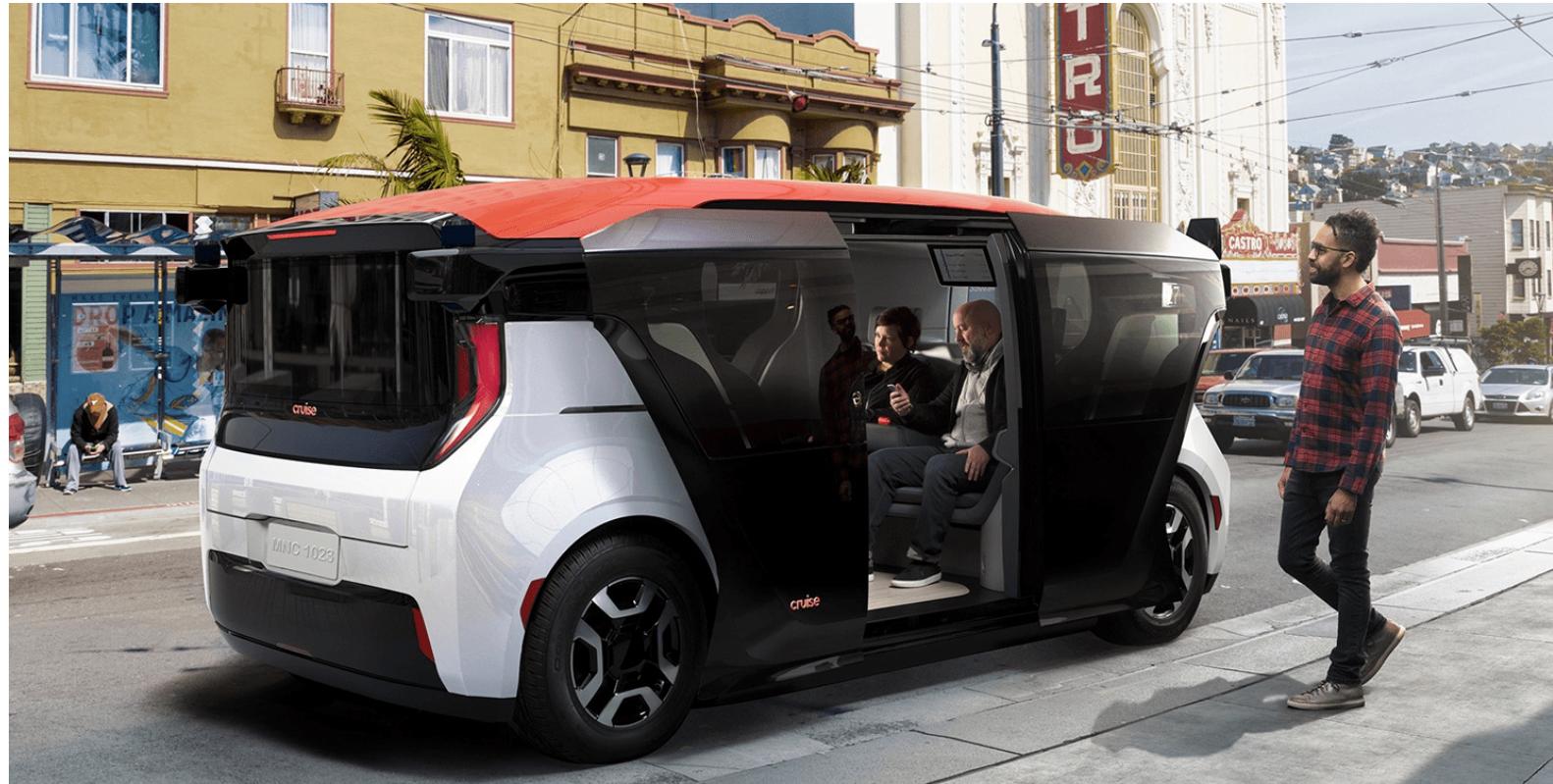
Luminar Technologies Hydra – 3D LiDAR Technology M Series



Lyft – Automotive Sensor & LiDAR Technology K Series: Power + Ethernet



GM Cruise – Self-Driving Electric Taxi, LiDAR Technology K Series: Power + Ethernet



NURO AI – Autonomous Delivery Service

T Series: SPE (Single Pair Ethernet)



Kodiak Robotics – Self-Driving Truck Sensor & LiDAR Technology K Series



Virgin Hyperloop One – High Speed Autonomous Rail Technology K Series



Gladiator TUGV (Tactical UGV) – U.S. Marine Corps M & F Series



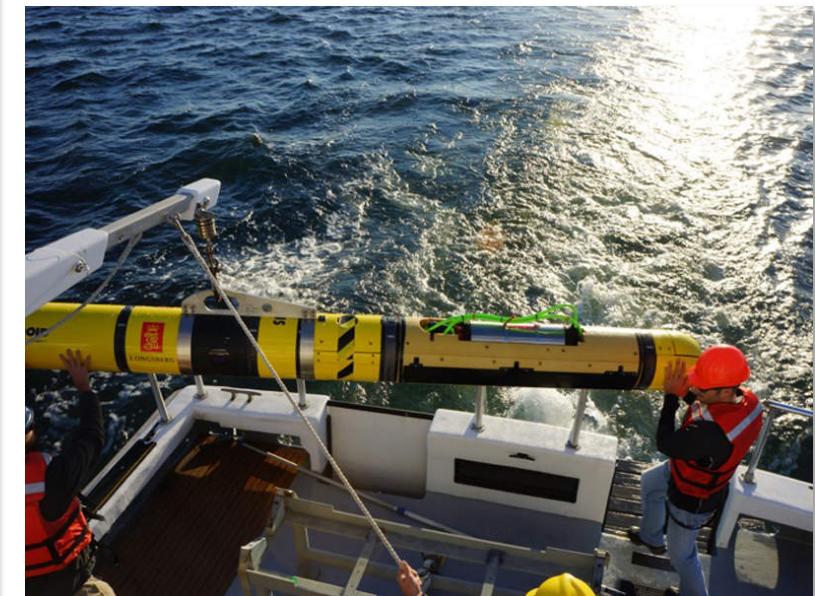
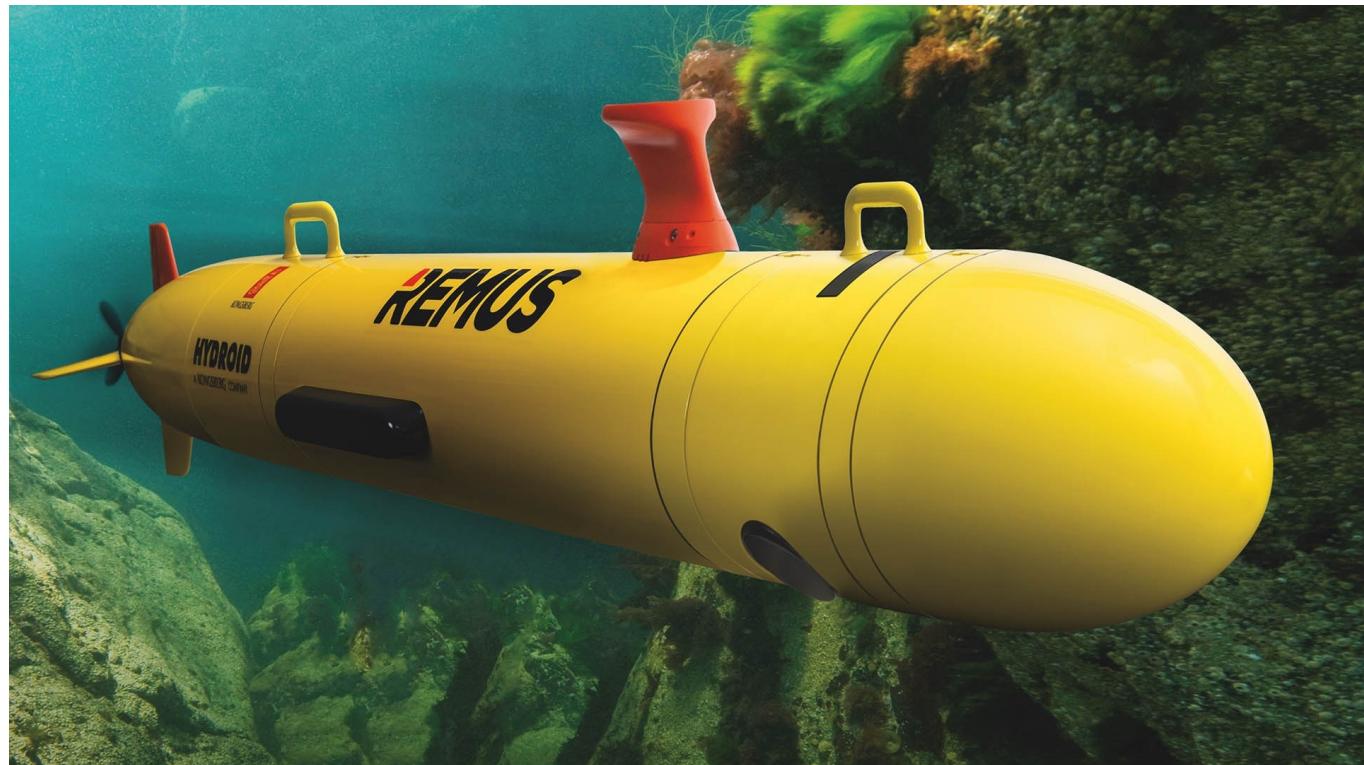
QinetiQ Talon – Multi-Mission EOD Robot F Series



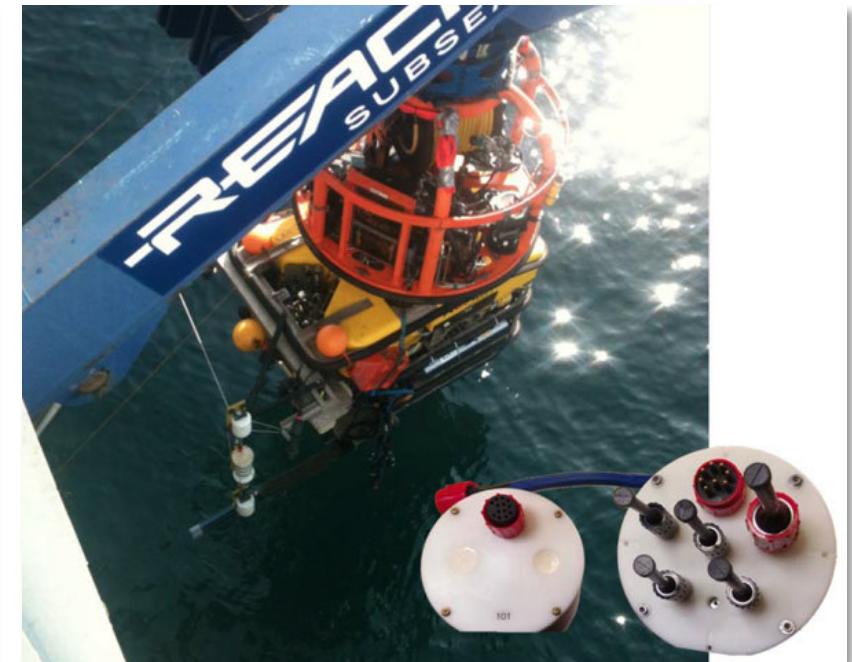
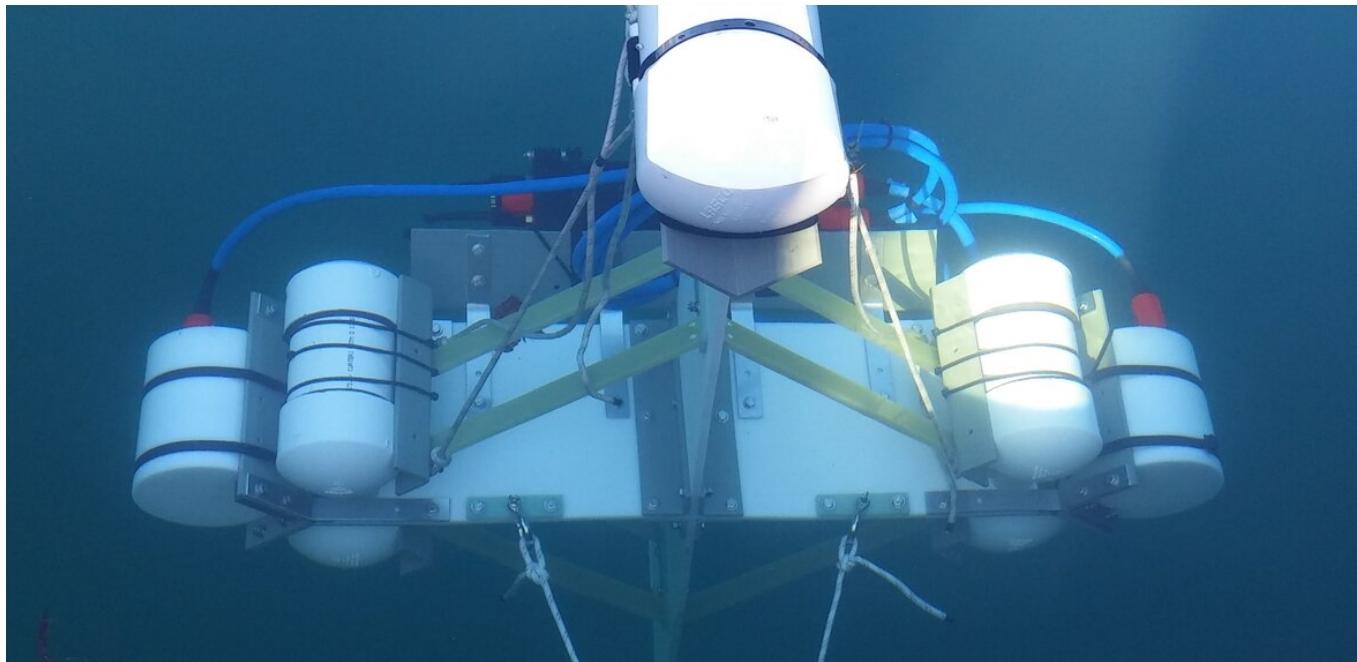
L3Harris T7™ Multi-Mission Robotic System F Series



Kongsberg Maritime, Hydroid – Portable AUV S Series



Optimal Ranging Orion – Cable & Pipeline Tracking System K Series



Break-away Connectors

Break-away or Quick-disconnect connectors provide secure latching with controlled release. Release forces typically range from 6-26 lbs. – depending on shell size and customization

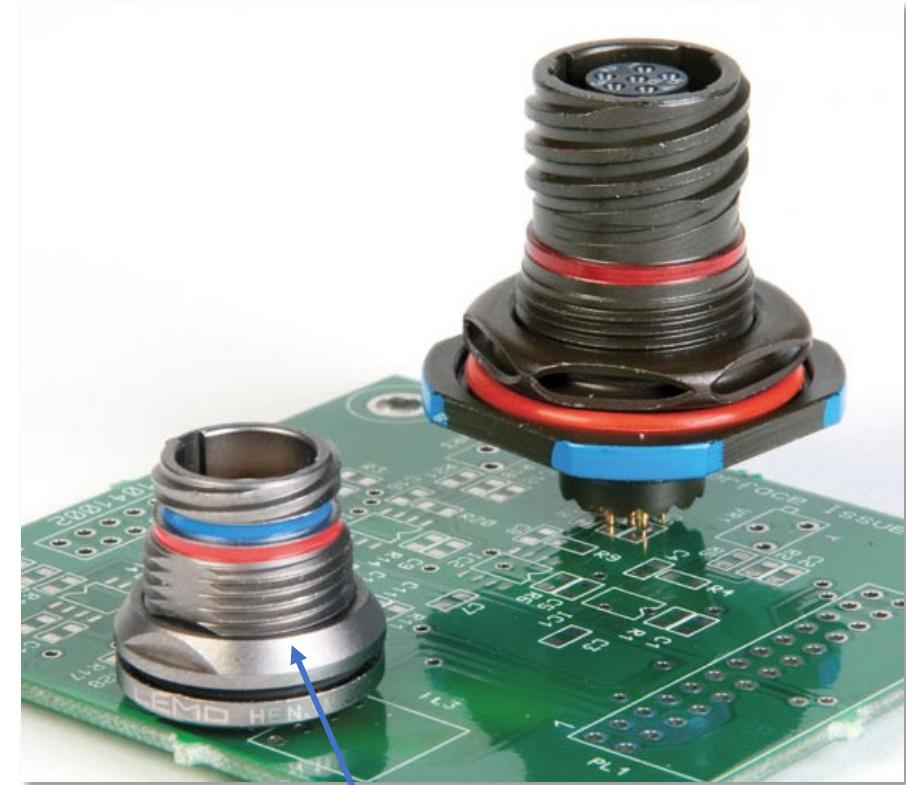


LEMO MIL-Spec Standards

LEMO is not a Mil-STD product, but
LEMO is tested to Mil-Spec standards!

LEMO Products Offer -

- Compact & Small (Miniature styles)
- Lightweight
- High-density
- High-reliability (mating cycles 3000 vs. 500)
- Push-pull or Ratchet Screw Type
- Break-away – Quick disconnect
- Many Shell Configurations
- Customization is LEMO's strength



LEMO M Series

LEMO M vs MIL-Spec Comparison



FEATURE	LEMO M Series	Glenair Mighty Mouse 805	D38999
MIL Standard	COTS	COTS	Yes
MIL-Spec Tested*	Yes	Yes	Yes
Mating Cycles	3000	500	500
Vibration Resistance	Yes	Yes	Yes
Twist Lock Latch	1/3 Turn	Full Turn	Full Turn
IP68 Water Resistance	Yes – 2m 15hr	Yes – 1m 1hr	Yes – varies
EMI Performance	Excellent	Excellent	Very Good
Lightning Tested/Rated	Yes – 10K amp	N/A	Some
Size Difference	–	10% Larger	220% Larger
Weight Difference	–	40% Heavier	280% Heavier
Crimp Pin Release	Front side	Back side	Back side
Back Shell Required	No	Yes	Yes

[*See M Series Brochure \(p. 2-3\) for full MIL-Spec Tests](#)

	M Series	F Series	T Series	K Series	H Series
Coupling Mechanism	Ratchet Coupling	Push-Pull	Push-Pull	Push-Pull	Push-Pull
Mating Cycles	3000 Min	1000 Min	3000 Min	5000 Min	2000 Min
IP Rating (Mated)	IP68	IP67	IP68	IP66/IP68	IP50/IP68
Standard Shell Plating and Material: Corrosion Resistance	Anthacite Nickel-plated Aluminum Alloy 48+ hours salt-fog	Anthacite Nickel-plated Aluminum Alloy 48+ hours salt-fog	Chrome-plated Brass 1000+ hours salt-fog	Chrome-plated Brass 1000+ hours salt-fog	Anthacite Nickel-plated Aluminum Alloy 48+ hours salt-fog
Shell Material Options	Chrome-plated Brass 1000+ hours salt-fog	-	POM Black Plastic NA	-	-
Shell Plating Options	NiCorAl™ 500+ hours salt-fog	Anthacite Nickel 48+ hours salt-fog	Matte Black Chrome 1000+ hours salt-fog	Matte Black Chrome 1000+ hours salt-fog	-
Blind Mating	3-5 Mechanical Keys	3-5 Mechanical Keys	1-2 Mechanical Keys	1-5 Mechanical Keys	Hermaphroditic Keying
Shell Styles	40+	12+	8+	28+	4+
Vibration Resistance	Vibration: 50-2000 Hz, 37.8 g rms-3 axes; 4 hr. TA	10-2000 Hz, 15 g	10-2000 Hz, 15 g	10-2000 Hz, 15 g	-
	Gunfire: 25 to 2000 Hz, 3 axes (MIL-STD-810F method 519.5)	Gunfire: pass (MIL-standard 810 F)	-	-	-
	Sine: 30 g, 3 axes, 12 hr. (MIL-STD-202 method 204-G)	-	-	-	-
Shock Resistance	300 g, 3 ms	100 g, 6 ms	100 g, 6 ms	100 g, 6 ms	100 g, 6 ms
Acceleration	50 g (MIL-STD-1344 - 2011-1, A)	-	-	-	-
Temp Range	-50 to 200° C	-50 to 200° C	-55 to 200° C	-55 to 200° C	-55 to 125° C
Shielding	Yes	Yes	Yes	Triple-Walled	Yes
LV Contacts	2 to 114	2 to 68	2 to 38	2 to 64	6, 12
HV Contacts	-	-	1 to 21	1 to 21	-
FO Contacts	Duplex	Duplex	1 to 14	1 to 14	2, 4, 6
Coax	Single	-	1 to 14	1 to 14	-
Fluidic	-	-	1 to 14	1 to 14	-
USB	USB 2.0	-	-	-	-
Cat 6A	Yes	-	Yes	Yes	-
LV Termination	Crimp	Crimp	Solder, Crimp, PCB	Solder, Crimp, PCB	Solder, Crimp
Right-Angle Option	With right-angle heat shrink	With right-angle heat shrink	Yes	Yes	No
Scoop Proof	Yes	Yes	Yes	Yes	Yes
UL Recognized	Yes	Yes	Yes	Yes	Yes

USV (Unmanned Surface Vehicles) UUV (Unmanned Underwater Vehicles)

Hydrographic Survey & Mapping
Oceanographic & Science Missions
Military & Defense
Port Security & Management
Oil & Gas
Offshore Wind Farms
Offshore Data Centers

Mapping
Marine Research
Military & Defense
Oil & Gas
Subsea Mining
Aquaculture
Telecommunications

* Majority within 50km from shore

Main Features

- Screw Coupling with Viton® O-ring
- Miniature Size
- Multipole with 2, 3, 4 or 6 contacts
- Coaxial 50 Ω type
- IP68

Benefits

- Hydrostatic Pressure ~60 Bar (mated)
- 360° EMC Shielding
- Rugged Chrome-plated Brass
- 1000+ hours Salt-fog



Main Features

- Screw Coupling with Viton® O-ring
- Stepped Inserts for Easy Alignment
- Multipole with 2, 3, 4 or 6 contacts
- Coaxial, Triaxial or Mixed
- IP68

Benefits

- Hydrostatic Pressure ~30 Bar (mated)
- 360° EMC Shielding
- Rugged Chrome-plated Brass
- 1000+ hours Salt-fog



Main Features

- Screw Coupling with Viton® O-ring
- Keying for Easy Alignment
- Multipole 2-64 contacts
- Fiber Optics or Mixed
- IP68

Benefits

- Hydrostatic Pressure ~30 Bar (mated)
- 360° EMC Shielding
- Rugged Chrome-plated Brass
- 1000+ hours Salt-fog

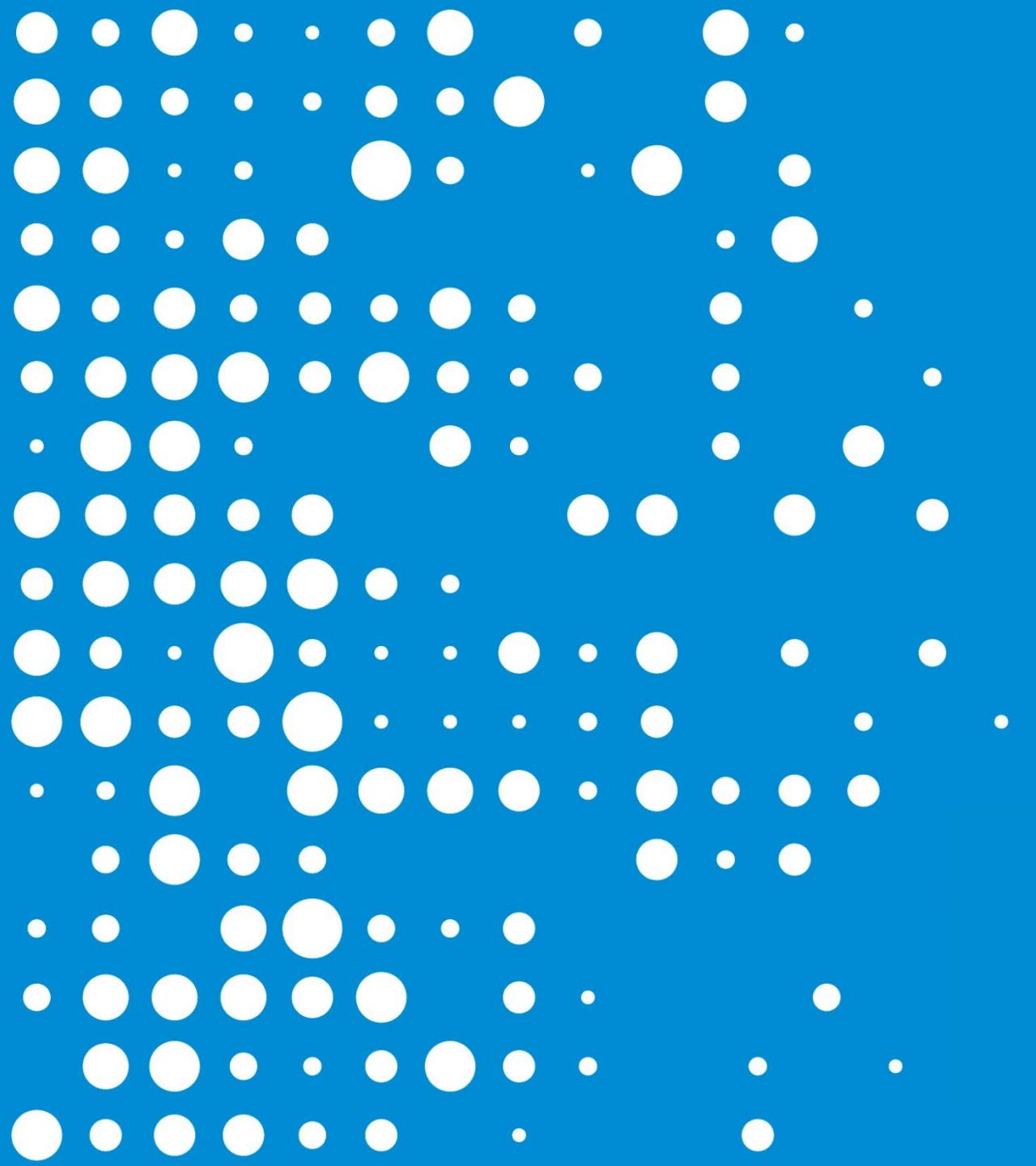


- Quality
- Expertise
- One-stop Shop
- Custom Design Capabilities

Applications where systems are frequently set up and torn down

Where connectors used externally on products

Critical applications where connector has to work every time



UxV Scenarios

Application: UAV - LiDAR

Contact type	Multipole
Contact number	114 LV
Environment	Harsh. Outside of vehicle
IP Rating	IP68
How durable?	Extremely Durable, Lightweight, Shielding Required
Plastic or metal housing?	Metal
Is cost a factor?	No

LEMO Series you would recommend and why?

Application: UAV - LiDAR

Contact type	Multipole
Contact number	114 LV
Environment	Harsh. Outside of vehicle
IP Rating	IP68
How durable?	Extremely Durable, Lightweight, Shielding Required
Plastic or metal housing?	Metal
Is cost a factor?	No

M Series

IP68, Ratchet Coupling for high vibe.
Lightweight aluminum shell.



Application: UAV - Flight Control

Contact type	Low Voltage Signal
Contact number	14 LV
Environment	Drone, Sealed Nacelle* (Cockpit)
IP Rating	IP50
How durable?	Lightweight. No Shielding Required
Plastic or metal housing?	Plastic
Is cost a factor?	Yes

LEMO Series you would recommend and why?

* Streamlined housing or tank for something on the outside of an aircraft or motor vehicle.

Application: UAV - Flight Control

Contact type	Low Voltage Signal
Contact number	14 LV
Environment	Drone, Sealed Nacelle* (Cockpit)
IP Rating	IP50
How durable?	Lightweight. No Shielding Required
Plastic or metal housing?	Plastic
Is cost a factor?	Yes

* Streamlined housing or tank for something on the outside of an aircraft or motor vehicle.

REDEL P Series

Lightweight & Low Cost



Application: UAV - Power for Wing-Mounted Propeller

Contact type	LV Power + High Current
Contact number	3 LV
Environment	Harsh. Outside of vehicle
IP Rating	IP67
How durable?	Durable. Lightweight. Compact. Shielding Required.
Plastic or metal housing?	Metal
Is cost a factor?	No

LEMO Series you would recommend and why?

Application: UAV - Power for Wing-Mounted Propeller

Contact type	LV Power + High Current
Contact number	3 LV
Environment	Harsh. Outside of vehicle
IP Rating	IP67
How durable?	Durable. Lightweight. Compact. Shielding Required.
Plastic or metal housing?	Metal
Is cost a factor?	No

F Series

Push-Pull, Lightweight, Compact. Shielded.



Application: TOP SECRET - UAV Ethernet

Contact type	LV Signal
Contact number	8 LV
Environment	Harsh. High Vibration.
IP Rating	IP68
How durable?	Durable. Lightweight. Compact. Shielding Required.
Plastic or metal housing?	Metal
Is cost a factor?	No

LEMO Series you would recommend and why?

Application: TOP SECRET - UAV Ethernet

Contact type	LV Signal
Contact number	8 LV
Environment	Harsh. High Vibration.
IP Rating	IP68
How durable?	Durable. Lightweight. Compact. Shielding Required.
Plastic or metal housing?	Metal
Is cost a factor?	No

M Series

IP68, Ratchet Coupling for High Vibe.
Lightweight aluminum shell.



Application: UGV - LiDAR

Contact type	Ethernet
Contact number	4 Twisted Pair (CAT6)
Environment	Vehicle Mounted
IP Rating	IP68
How durable?	Extremely Durable, Shielding Required
Plastic or metal housing?	Metal
Is cost a factor?	No

LEMO Series you would recommend and why?

Application: UGV - LiDAR

Contact type	Ethernet
Contact number	4 Twisted Pair (CAT6)
Environment	Vehicle Mounted
IP Rating	IP68
How durable?	Extremely Durable, Shielding Required
Plastic or metal housing?	Metal
Is cost a factor?	No

K or T Series

IP68, Push-Pull



Application: TOP SECRET

Contact type	LV, HV, Fiber, Pneumatic
Contact number	2 LV, 2 HV, 1 Single Mode Fiber, 1 Pneumatic
Environment	High Vibe Xtreme High Temp >3000°C
IP Rating	IP68
How durable?	Extremely Durable, Lightweight Shell, Ceramic Insulator, Shielding Required
Plastic or metal housing?	Metal - Titanium
Is cost a factor?	No

LEMO Series you would recommend and why?

Application: TOP SECRET

Contact type	LV, HV, Fiber, Pneumatic
Contact number	2 LV, 2 HV, 1 Single Mode Fiber, 1 Pneumatic
Environment	High Vibe Xtreme High Temp >3000°C
IP Rating	IP68
How durable?	Extremely Durable, Lightweight Shell, Ceramic Insulator, Shielding Required
Plastic or metal housing?	Metal - Titanium
Is cost a factor?	No

Custom M Series

IP68, Ratchet Coupling for High Vibe.
Lightweight Titanium Shell.





Thank You