

An offshore oil rig is silhouetted against a dark, stormy sky. The rig is positioned in the middle ground, with its complex structure of towers and platforms visible. The sea is turbulent, with white-capped waves crashing against the rig's legs. The overall atmosphere is one of harsh, industrial resilience.

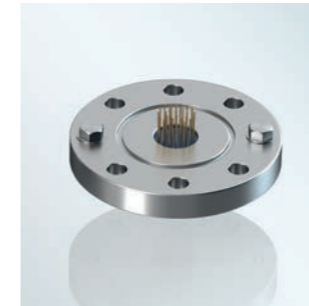
SCHOTT
glass made of ideas

Uncompromised
Reliability for
Oil & Gas Electronics

SCHOTT is a leading international technology group in the areas of specialty glass and glass-ceramics. With more than 130 years of outstanding development, materials and technology expertise, we offer a broad portfolio of high-quality products and intelligent solutions that contribute to our customers' success.

SCHOTT Electronic Packaging is a world-leading supplier of hermetically-sealed components for the reliable, long-term protection of sensitive electronic devices. Our products enable electronics in oil & gas equipment to function reliably deep underwater and underground. Drawing on more than 75 years of manufacturing expertise, SCHOTT components are designed to withstand the challenging operating conditions found in oil & gas application environments of 400°F temperatures and pressure levels of 20,000 PSI. This handbook provides helpful information on the advantages of Eternaloc® Subsea Connectors and Feedthroughs.

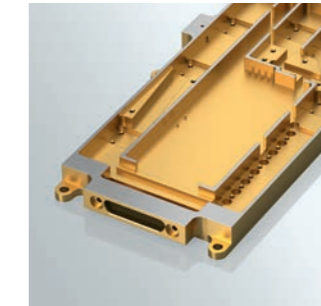
Made to survive the conditions of hell on earth.



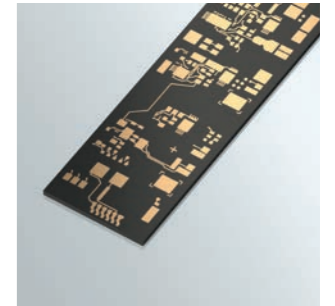
Subsea feedthroughs



Exploration connectors

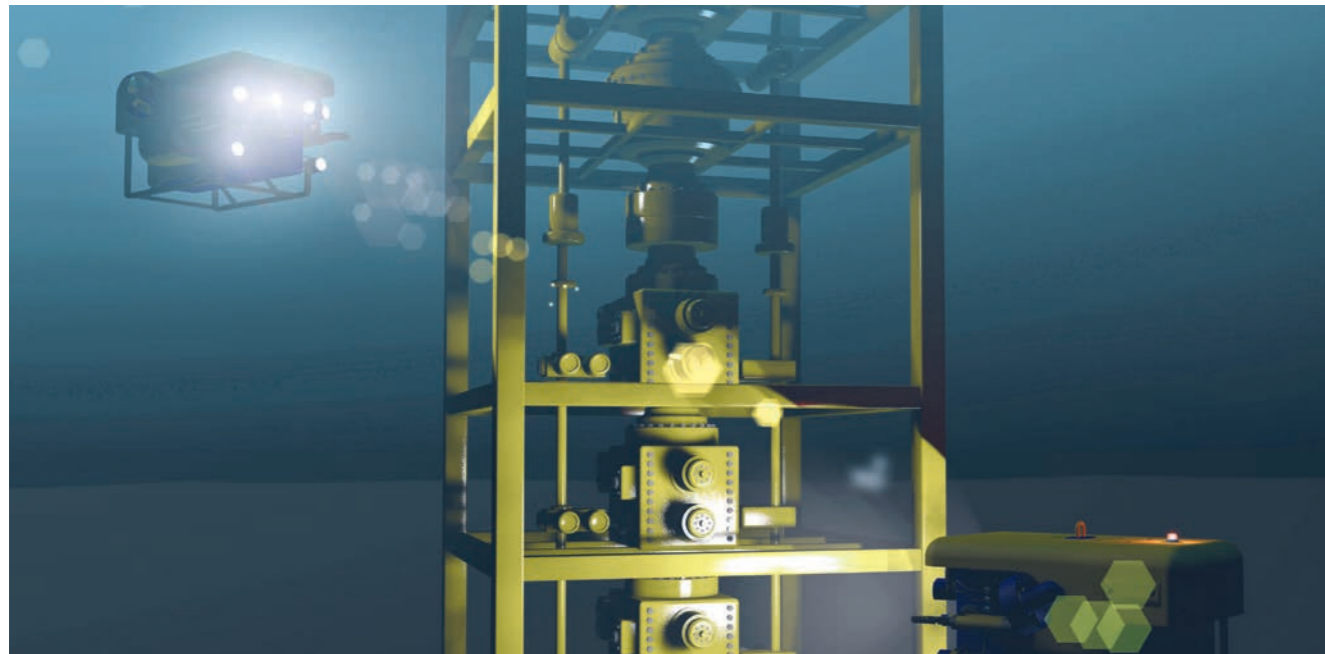


MCM housings



Ceramic PCB substrates





SCHOTT Eternaloc® Subsea Connectors & Feedthroughs

Years of maintenance-free robustness above 20,000 PSI

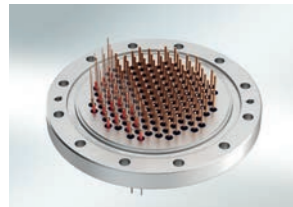


Product Information

Eternaloc® connectors are maintenance-free, customizable barriers that are hermetically sealed and remain leak-tight, even after years of use. They offer long-term durable protection of subsea tree components, such as wellhead pressure sensors, in high temperature, high pressure conditions.

Advantages

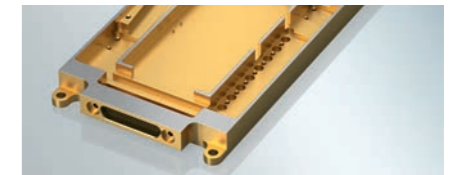
- **Long-term, maintenance-free durability can prevent costly component replacements:**
Decades of proven maintenance-free performance in harsh environment applications, including nuclear power plants, LNG and hydrogen gas cooling.
- **Superior pressure resistance:**
- Design pressure: 20,000 PSI
- Burst pressure: 50,000 PSI
- **Made for extreme temperatures:**
For ranges from -274°F to +842°F (-170°C to +450°C).
- **Simplifying your processes with less welds:**
We can offer complete subsea connector assemblies.
- **Fully customizable:**
- Large variety of specialty glass materials and metals available, including fiber optic glass.
- Dimensions up to 23 inches (600 mm) diameter, 20 inches (500 mm) height and 550 lb (250 kg) weight.
- Electrical performance up to 13,800V, 1500A; coax, triax and fiber optic connections available.
- Additional insulating materials available, such as PEEK, PTFE, shrinking tubes and potting materials.



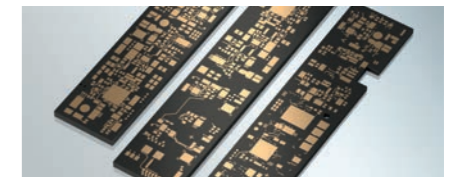
Multi-Chip Module Housings and Multilayer Ceramic Circuit Board Substrates – High temperature- and shock-resistant packaging for exploration and subsea electronics

Product Information

Hermetic multi-chip module (MCM) housings are used for protective packaging of sensitive measurement and control electronics in harsh environment conditions. Simultaneously, built-in Glass-or Ceramic-to-Metal Sealed Connectors enable power and signal transmission (electrical and optical) into and out of the package.

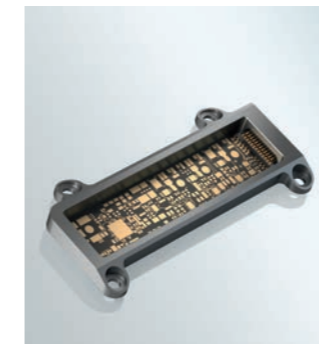


Multilayer ceramic feedthroughs and circuit board substrates enable miniature 3D interconnect solutions, paving the way for high-density input/output capability in small-form-factor packages. The material's superior thermal conductivity and high temperature resistance beyond 572°F (300°C) make these substrates a perfect fit for high-power applications.



Advantages

- **High-temperature glass or ceramic materials:**
Suitable for working environments of 347°F / 175°C and above.
- **Shock and vibration resistance:**
Designed to endure extreme pressure and vibrations in harsh working environments.
- **Customizable and space-saving:**
Miniaturized 3D interconnect designs can be custom made for specific application needs.



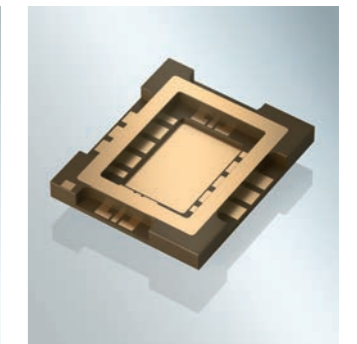
Multi-Chip Modules (MCM) with Kovar® and Ti packages and HTCC multilayer ceramic circuit board substrate



High-power amplifiers with heat sink



High-pressure feedthroughs



High-power/high-frequency surface mount package with heat sink



SCHOTT Eternaloc® Connectors for Oil Exploration

Superior HPHT robustness above 35,000 PSI

Product Information

SCHOTT has developed customizable Eternaloc® connectors for use in high pressure, high temperature oil & gas exploration environments. Eternaloc connectors are designed to support safe and reliable transmission of valuable data and information provided by sensors in Wireline, MWD and LWD applications.

Advantages

- **35,000 PSI and above:** Robust glass-to-metal seals maintain integrity in some of the harshest environments on earth with 35KSI design pressure and 50KSI burst pressure resistance.
- **Superior pressure resistance and insulation resistance under extreme conditions:** $\geq 10G\Omega$ - with our high-temperature sealing glasses, higher IR can be achieved at 500°F / 260°C in some circumstances.
- **Extreme temperature resistance:** Eternaloc® connectors are designed to withstand temperatures in excess of 500°F / 260°C.
- **Fully customizable:** Single and multi-pin, male/female connections, and custom materials – flexible design and sampling for a variety of applications.



Specialty glass seals – The secret to success

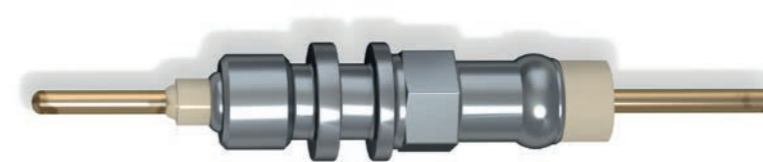
Thermoplastic

The extreme conditions in drilling applications are prohibitive for lesser-quality materials. Connectors using thermoplastic seals are prone to deformation from creepage, leading to an increased risk of seal compromise.

SCHOTT glass-sealing

Connectors sealed with specialty glass maintain integrity even at 35KSI / 500°F (260°C) thanks to:

- Inorganic, non-aging material
- Resistance to extreme temperatures



Glass seals maintain integrity

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