

## VetcoGray SemStar5™ subsea electronics module

Rigorously tested and field-proven for ultra reliability and flexibility to match any communications requirements

Our VetcoGray SemStar5™ is a fifth generation subsea electronics module for production control system applications. The product captures design heritage and learning from over 25 years of subsea experience.

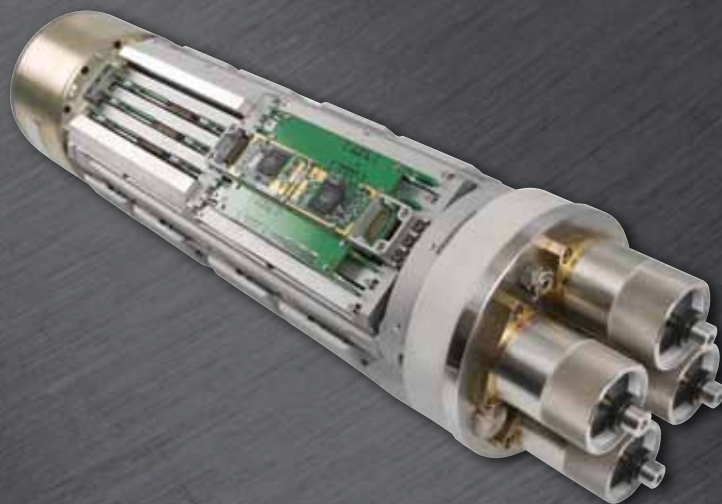
This enhanced new design delivers: open architecture communications access, modular ethernet backplane, support for industry standard interfaces, improved reliability and obsolescence mitigation and superior ruggedization to exceed ISO 13628-6 requirements.

### Communications

- SemStar5 uses an internal ethernet data bus supporting TCP/IP
- Flexible subsea communications options are provided by:
  - Fiber-optic modems, up to 1Gbit/sec data rate at up to 200 km ranges
  - DSL modem – up to 5 Mbit/sec point-to-point at ranges up to 40 km
  - RS-422 interface for high speed short distance communications up to 800 m (e.g. around a subsea template/manifold)
  - Variable-speed copper modem (VSCM), speeds from 9.6 K to 115.2 Kbit/sec (including support for legacy protocols)
  - Low-speed copper modem (LSCM), (1.2 Kbit/sec) for legacy SEM support
  - Direct ethernet at 100 Mbit/sec
- IP enabled
- Plug-and-play subsea LAN

### Enhanced reliability

- Redundant DC power supply to internal modules
- Redundant ethernet “Distributed Star Topology” for backplane and inter-bay communications
- Single-board computer (SBC) based on 32-bit microcontroller can be fitted to any module that requires processing capability
- A high-integrity, industrial real-time operating system (RTOS), “QNX” is used for its fault tolerant architecture; this RTOS has extensive use in other GE industrial control products
- Robust internal electrical harness design
- Reduction in number of internal wiring interconnections needed relative to earlier generations
- Simplified motherboards using press fit connectors for greater quality control and improved reliability
- Each functional circuit board has its own built-in diagnostics
- Fault-tolerant input/output (I/O) interfaces



## Obsolescence management for electronic components

- Design includes significant 'future proofing' features
- Components assessed as high-risk are grouped onto replaceable modules
- Pan-GE purchasing power used to secure future component supplies
- Component obsolescence monitoring program already active to industry standards (as recommended by the cross-industry Component Obsolescence Group)

## Industry standard interfaces

SemStar5 provides the following industry standard interfaces:

- SIIS (Levels 1, 2 & 3)
- IWIS

The full sensor interface capability is provided by:

- Sensor support module (SIIS levels 1 & 2)
- Fieldbus support module (SIIS level 2 & 3/Modbus)
- IWIS support module (PPP channels)

## Ruggedization

- Thermal management design practices validated through thermal modeling
- Robust mechanical construction to meet the shock, vibration and temperature cycle requirements of ISO 13628 Part 6
- Extensively qualified over and above the requirements of ISO13628 Part 6
- Highly accelerated life testing (HALT) program designed to verify robustness and to validate reliability prediction
- High-speed ethernet backplane permits full analysis when undertaking unit environmental stress screening

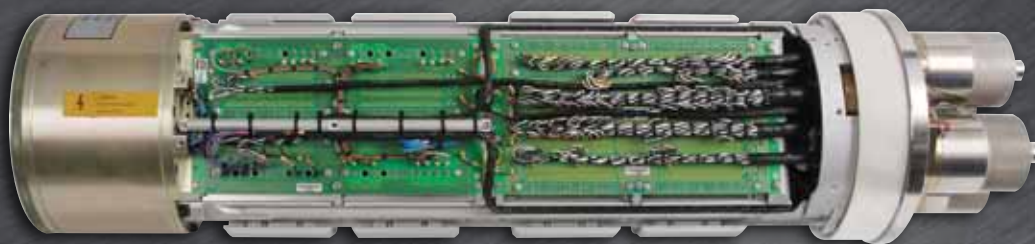
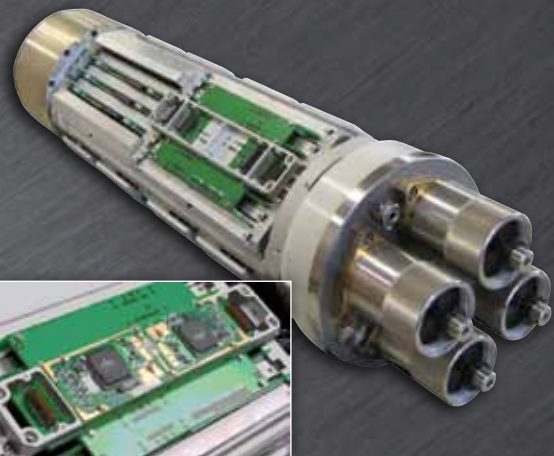
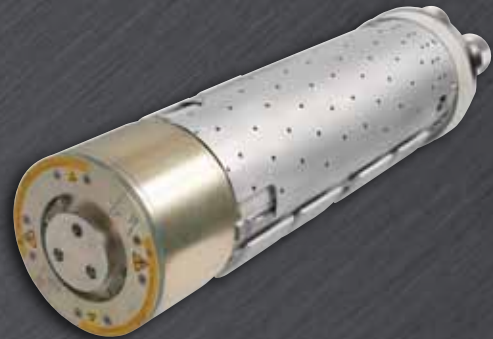
## Functionality

- SemStar5 is available in 1, 2 and 3 bay configurations for maximum functional flexibility

## Additional applications

The flexibility of the SemStar5 architecture allows the same components to be used for many subsea applications:

- SemStar5-R provides a maritized SEM to support remote interfaces and provide flexible system architectures
- SemStar5 architecture is used in communications electronic modules (CEM) to provide a subsea communication router (patented solution) capability along with smart power distribution features



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GE imagination at work

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