



SIL 3 Signal Conditioner for Hydrogen Sensors

Teledyne Gas and Flame Detection (Teledyne GFD) in collaboration with F4E, have developed a new SIL 3 signal conditioner that allows to use the traditional Teledyne hydrogen sensors in extreme environments like the tokamak reactor in ITER.

The technology

Teledyne GFD has introduced a specialized electronic signal conditioner, enabling the use of their commercial nuclear power plant hydrogen sensors in extreme fusion environments like ITER. The unique conditions within ITER, including high magnetic fields and intense radiation and neutronic flux, prevent the placement of complex electronics near the tokamak. In response, Teledyne developed new electronics that convert the signal from their catalytic hydrogen detection probes into a 4-20 mA output signal, fully compliant with SIL 3 certification of the IEC 61508 standard.

This innovation allows Teledyne GFD's hydrogen sensors, typically used in nuclear power plants, to meet the stringent safety requirements of fusion reactors while offering compatibility with other industries soon expected to mandate SIL 3 compliance.

Advantages and Potential Applications

- Fully compliant with SIL 3 of the IEC 61508 standard.
- Enables the use of Teledyne's hydrogen sensors in SIL 3 environments, including fusion reactors.
- Improved maintenance: The signal conditioner can be positioned away from the sensor, allowing electronics to be placed in more accessible locations.
- Relevant industries: Nuclear Power Plants, Hydrogen (H₂) production, storage, and distribution sectors, which are expected to increasingly demand SIL 3 compliance.

Collaboration opportunities

This new technology is ready for industrial deployment and available for further development, and adaptation to other settings where hydrogen detection plays a crucial safety role.

Fusion for Energy Technology Transfer
Programme

Email: technologytransfer@f4e.europa.eu