



## 1.0 Technical Description

### 1.1 Wireless ESD System

The Wireless ESD system comprises a fully duplicated shutdown system with up to 20 input and 8 output channels to provide a comprehensive monitoring and shutdown system. The system comprises the following components:

#### Workover Vessel/Rig and FPSO Central Control Room

- Operator Interface Panel
- Local push button Assembly units (field mounted – “Simple Apparatus”)
- Dual SIL 3 Certified Logic Control PLC c/w “SafeEthernet” & Modbus Communications Ports
- Dual Ethernet Radio Interface Unit
- Dual Spread Spectrum Radio 5.8 GHz Licence Free Band
- Dual High Gain Circular Polarised Antenna
- Dual Low Loss Antenna Cable
- Dual Lightning Suppressors
- MODU/DSV Field Cabinet IP66 316L Stainless Steel & DNV certified container (optional)
- FPSO Safe Area 19” System Cabinet IP55 (Wall/Floor Mount)

### 1.2 Safety PLC

The proposed Wireless ESD System comprises a fully duplicated SIL3 certified PLC with fully duplicated input and output channels with cross monitoring. Each SIL 3 PLC continuously monitors the status of inputs and outputs and communications links between the Control Room (CCR) and the FPSO, on each channel independently.

The compact and modular safety-related PLC has been developed specifically for the time-critical requirements of Factory Automation on the basis of proven safety technology.

The safety-related networking of the system takes place on **safeethernet**, which is based on standard Ethernet technology and is certified to TÜV/BG. **safeethernet** speeds up the transmission of safety-related data to 100 Mbit/s and now supports the use of all Ethernet functions, even for the configuration of safety-related networks.

SIL 3 PLC systems and **safeethernet** - a combination of high-speed safety-related control and high-speed safety bus - reach a level of flexibility in terms of providing solutions for time-critical automation tasks that was previously unheard of.

The performance of the PLC series, which is certified to IEC 61508, EN 954-1 and DIN V 19250, even enables the integration of relay functions into the PLC, a factor that increases flexibility even further.

#### Key features of all PLC systems:

- Certified up to SIL 3, Kat. 4 and AK 6
- Response time less than or equal to 20 ms
- Cycle time for a K program approx. 0.02 ms

### 1.3 SafeEthernet Communications

Safeethernet was developed back in 1997 and since then has been successfully deployed to build safety-related networked applications.

Safeethernet is based on standard Ethernet technology, is TÜV-certified for use up to SIL 3/AK 6, and can be designed as single or redundant configuration.

All Ethernet functionality and transmission media can be implemented on safe**ethernet**, which also supports satellite networks. Safeethernet accelerates the transmission of safety-related data to 100 MBit/s and therefore enables the effective safety-related networking of up to 64 systems.

Safeethernet recognizes and rejects false data, acknowledges correct receipt and resets values if a link is missing.

**Secure communications up to SIL3/AKA6 is guaranteed by the “Safeethernet” protocol. The protocol is proven on all transmission media types and therefore has no impact on the integrity of the safety function of the entire end-to-end system.**

### 1.4 Spread Spectrum Radio

Our standard SIMOPS or Workover Vessel ESD system comprises DUAL Direct Sequence Spread Spectrum Radio systems. These are therefore included as an option in our proposal to provide a comprehensive, proven and fully integrated ESD system.

Dual Direct Sequence Spread Spectrum Radio systems are provided to ensure maximum system availability and system integrity. The system comprises compact communications interface modules and unitised SS Radio transceivers.

The Wireless Ethernet Bridge enables high-speed data links to be established between buildings with line of sight distances of up to 60 km. The use of 5.8GHz direct sequence spread spectrum technology provides robust, reliable, and secure transmissions under all weather conditions.