

# High Integrity Protection System (HIPS) – A Safety Instrumented System (SIS)



Actuated Valve Package HIPS

## Product Definition

Frames High Integrity Protection Systems (HIPS) play a crucial role in site safety. By automatically bringing dangerous processes to a predictable safe state within a defined safety time, our systems protect site personnel, the general public and the environment, along with valuable production assets.

By selecting a Frames HIPS, our clients protect their business from an over-optimistic dependence on underlying systems such as the DCS and the ESD system, while also virtually eliminating problems caused by manual intervention (e.g. operator errors). Frames HIPS allow our clients to rely on the independent safety system as a last line of defense within the process plant. In many cases, this eliminates or reduces the need for pressure relief, including environmentally harmful flaring.

## Product Description

To meet client demands, Frames has developed a comprehensive range of HIPS solutions, including:

- High Integrity Pressure Protection Systems
- High Integrity Temperature Protection Systems
- High Integrity Level Protection Systems
- HIPS Interlock Systems

### HIPS - Customized safety solutions

At Frames, we work closely with your business to develop customized HIPS solutions that match your unique process conditions, design conditions such as plot space, and other site-specific requirements. Our flexible HIPS solutions can be configured as skid-mounted units, including integration of hydraulic power units, cabinet-mounted logic solvers, built-in initiators, intermediate piping and other components.

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HIPPS Logic Solvers



HIPS Interlocking Manifolds

## Process Description

Frames High Integrity Protection Systems are often used to protect a process line or vessel from any combination of overpressure, high temperature, or high-level events. This is normally achieved by closing the actuated HIPS valves or stopping the pumps in the production process line in a timely matter to create a safe state.

Our HIPS typically use one set of initiators (e.g. voting 2oo3 or 1oo2) to measure the process conditions, a logic solver (controller) to process the measured data, and a set of end elements to provide the safeguarding action. End-elements can include valve/actuators or pumps, together with circuit breakers that perform the closing (shutdown) action.

## Project Management

Our Frames teams of engineers are experts in Safety Instrument Systems (SIS) and functional safety projects. This includes the critical first step of defining SIS requirements in terms of safety instrumented functions and integrity level. We fully support our clients during the study, (pre-)FEED and detailed engineering stages to ensure their sites operate within required safety levels.

### Best-practice processes

We work with our clients to follow IEC 61508 and IEC 61511 standards that ensure their HIPS solution remains independent from all other systems and meets the reliability criteria of the standards, while also adhering to the best engineering processes.

Frames executes Functional Safety Engineering activities such as HAZOP (cause & effect) studies, SIL calculations, Markov, fault-tree analysis and reliability block diagrams to define an HIPS solution that meets good engineering practice according to the client's needs under the condition of compliance with IEC standards. By combining this data with reliability figures from databases or component suppliers, we are able to guarantee the safety integrity level (SIL) of the SIS design.

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## Functional Safety Management System

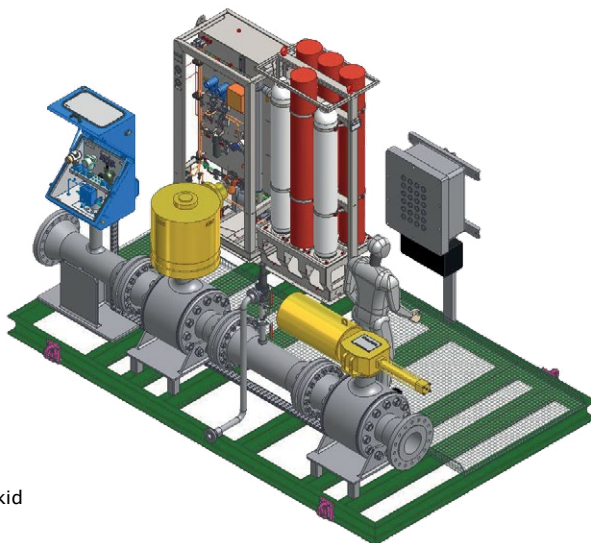
Our Quality Management System comprises a TÜV-certified Functional Safety Management System (FSMS) that ensures all work complies with IEC 61508 and IEC 61511 standards. We have functional safety project engineers leading each engineering discipline, such as process, mechanical, electrical, instrumentation, control, materials and functional safety. This guarantees safety and client-focused awareness in every step of the functional safety project in accordance with our TÜV-certified FSMS.

All safety life-cycle steps are recorded and documented in the Frames Document Management System (DMS). This ensures data such as used failure rates for SIL calculations, proof test records, procedures and even assumptions underlying designs can be fully historically tracked back for site operation, service and maintenance.

## Technical Details

Frames stands apart in the design and commissioning of completely integrated skid or frame-mounted safety solutions. We are an independent supplier and execute HIPS components in a wide range of materials to fit client-specific design codes and operating standards, including IEC (61508, 61511, 61131), API (6A, 6D, 520, 607, 6FA, 14C), ISO (9001, 14001, 5208, 15156), ASME (B16.34, B16.10), NACE (MR 01-75) and ATEX.

To guarantee performance, every Frames HIPS is tested and checked by means of an Integrated Factory Acceptance Test (IFAT) before it leaves our Frames workshop.



Integrated HIPS Skid

## Added Value Frames

- Expert in integrating Safety Instrumented Systems
- Multidisciplinary organization (process, mechanical, electrical & instrumentation, controls, materials, functional safety)
- Independent supplier and total solution provider
- Broad experience and expertise in applying IEC standards
- Broad experience in hazard (HAZOP) studies, fault-tree analysis, third-party certification
- Broad experience as an integrator in designing, building and testing fully integrated systems

## References

- Moho Nord, Technip France, Total – Congo
- P-52, P62 FPSO, Quip S.A., Petrobras – Brazil
- Castor UGS, Kiewit Offshore Services, Escal UGS – Spain
- Aseng FPSO, Single Buoy Moorings Inc., Noble Energy Inc. – Equatorial Guinea
- Kizomba 'C', Saxi-Batuque FPSO, Single Buoy Moorings Inc., ExxonMobil – Angola

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# Frames Family Tree

