ABB Safety Solutions

Independent High Integrity Safety System

Independent High Integrity Introduction

ABB has over 40 years of experience in the design, manufacture and implementation of process safety systems. With operations on all continents and dedicated safety system teams around the world, ABB provides not only highly-qualified technical resources during project delivery, but also ensures competent local support and service in operation.

—
The Independent HI is certified for SIL3 by TÜV to the IEC61508 and IEC61511 standards for safety


EC-Type Examination Certificate
No. M6A 14 05 29902 011


CERTIFICATE
No. Z10 14 05 29902 010

The newest safety system offering in ABB's portfolio is the Independent High Integrity (HI) TÜV Certified Safety System. This system has been designed to address opportunities in projects where a physically and functionally segregated safety concept is desired.

Independent HI consists of the following components:

- AC 800M HI SIL3 controller
- S880 Series SIL3 I/O modules
- Select I/O single channel SIL 3 modules
- Control Builder Safe Engineering Tool (TÜV certified)
- SIL Certified engineering libraries
- Connectivity interfaces to other systems and visualization packages
- Diagnostic tools

Outstanding features of the Independent HI offering are:

- Available redundancy for high availability (~ 99.9999%)
- Near 100% diagnostic coverage without hardware fault tolerance factors or voting
- Communication modules for safety peer to peer and interfacing with ABB and 3rd party equipment
- Certified libraries for streamlined engineering ensure sustainable solutions over the application lifecycle
- Single controller for applications up til SIL3

There have been over 5,500 safety controllers and 750,000 SIL certified I/O points installed globally since the release of High Integrity in 2005.

The Independent HI system consists of the Control Builder Safe engineering tool, a Safety controller from the AC 800M HI series and appropriate I/Os from the S880 or Select I/O series supporting applications for certified safety operations. For an operational view, Independent HI can be connected to any HMI via OPC or MODBUS.

Independent HI is the perfect solution for any industry with a safety critical application from Oil & Gas (on/off shore, midstream), to Petrochemical and Chemical or Pulp & Paper and Power in applications such as relay/interlock system replacements, boiler control retrofits, Burner / Boiler Management Systems (BMS), High Integrity Pressure Protection Systems (HIPPS), and Remote Terminal Units (RTU's) on critical pipelines.

Since it can be interfaced with any process control system, Independent HI can be used with ABB's Freelance or Symphony Plus (Harmony and Melody) systems or our heritage (Advant, MOD300) technologies as well as 3rd party control systems or PLC's.

In addition, visualization is available through 3rd party process control systems, HMI software and/or process panels (i.e. ABB's Compact Product Suite or Panel 800), making Independent HI the perfect SIL3 certified safety system independent of the control system technology or vendor on your site.

Independent High Integrity Applications

Emergency Shutdown (ESD)
An ESD system will take the plant to a predefined safe state if the basic process control system and/or the process shutdown system fails to gain control of the process. The ESD system must be extremely reliable and function on demand. TUV certification to SIL2/3 according to the IEC 61508 and IEC61511 (ISA84) standards is required. The Independent HI safety system is the perfect solution for ESD applications.

Relay Interlock Replacement
Relay interlock systems were installed prior to 1st generation safety systems in order to protect people and equipment. They relied on manual pushbuttons and operator intervention for shutdown action. Many of these systems are still in place today, grandfathered under the new standards. Relay systems provide no diagnostics and limited visibility into the equipment and process, so they are a good target for replacement with the Independent HI.

Burner / Boiler Management (BMS)
BMS Systems are dedicated to combustion safety and operator assistance in the starting and stopping of fuel preparation and burning equipment and for preventing mis-operation of and damage to this equipment. A BMS requires compliance IEC61508/61511 standards and other related national or international codes (i.e. NFPA 85). The Independent HI is a great fit for this application especially when used together with ABB's UVISOR Flame Scanner technology.

Remote Terminal Units (RTU)
An RTU is responsible for remote site automation, monitoring and telemetry. RTU's include both local and remote control. They are typically found on pipeline monitoring, oil & gas wells, pumping stations, tank level and temperature applications. Safety controllers are used in RTU applications when hazardous chemicals or conditions are present. The Independent HI with its extended communication capability is a very good fit for this application.

High Integrity Pressure Protection (HIPPS)
High Integrity Pressure Protection System is a Safety instrumented system designed to meet SIL3 and a high availability, its purpose is to mitigate identified overpressure scenarios. The HIPPS must provide an installation that is as safe or safer than the pressure relief device that it replaces. Industry is increasingly moving towards utilizing HIPPS to reduce flare loading and prevent the environmental impact of pressure venting. Independent HI can provide the certified SIL3 performance required for this application.

Fire and Gas (F&G)
Fire & Gas systems detect fire, gas leakage and initiate firefighting, shutdown and isolation of ignition sources. The F&G is a mitigating layer of protection, because the purpose is to reduce the consequence severity of such an event when it occurs. It is common to design a F&G as normally de-energized (NDE), meaning the loop must be energized in order to initiate a trip of the F&G. Independent HI's flexible architecture and array of certifications make it a good solution for fire and gas systems.

Independent High Integrity Functionality

The Independent High Integrity system meets the same high level of quality and safety functionality as ABB's System 800xA High Integrity integrated safety system. The benefit is that it stands alone providing a physically and functionally segregated safety solution.

The features and functionality you will receive with an Independent HI system are defined below:

Meets Industry Standards
Independent HI systems are delivered and supported in accordance with the strictest current standards. The system meets among others the IEC61508, IEC61511, IEC62061, EN 50156-1, EN298, EN ISO 13850 standards.

In addition to defining product requirements, these standards specify procedures and routines for all activities required to manage safety throughout the entire lifecycle of the SIS system. This includes planning, design, implementation, documentation, training, operation, and maintenance. Due to its strict accordance with the relevant standards, TÜV has certified all product components of the Independent HI Safety offering.

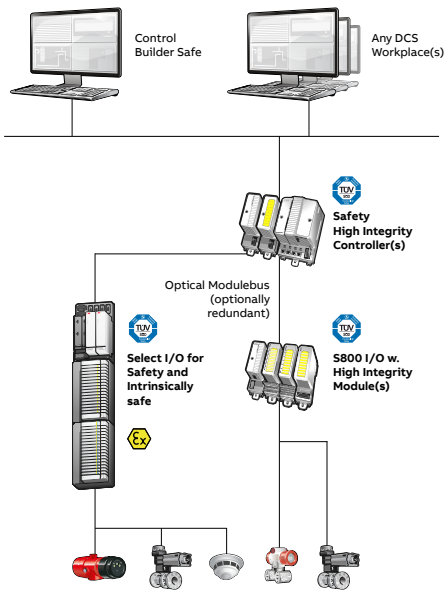
AC 800M High Integrity Controller
The AC 800M HI offers a SIL3 TÜV certified control environment for process safety in a single controller. The AC 800M High Integrity controller is realized by combining the processor module (PM857, PM863 or PM867) with the safety module (SM812). Flexible redundancy schemes enable controller configurations up to and including Quad configuration.

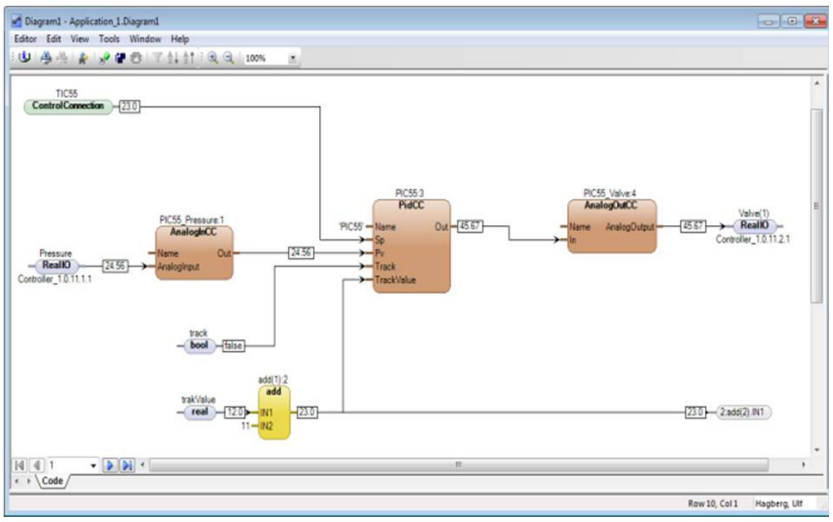
In SIL rated applications, it is possible to choose among up to three IEC 61131-3 languages, Function Block Diagram, Structured Text, and Sequential Function Charts. For non-SIL applications, all five IEC 61131-3 languages are available for use.

High Integrity I/O
The S880 safety I/O is a distributed, highly modularized and flexible I/O system, providing easy installation of I/O modules and process cabling. S880 I/O modules and their termination units can be mounted and combined in many different configurations to fit any space requirements or meet the needs of any application. A comprehensive assortment of I/O modules and accessories are available for safety critical and non-critical use.

Within the S880 I/O family, there are SIL3 compliant modules for safety critical applications including 4 - 20 mA analog inputs, 24 Vdc digital inputs and 24 Vdc digital outputs. The digital output module provides both Normally Energized (ESD) and Normally De-energized (F&G) outputs. Analog inputs support HART routing for easy calibration checking and diagnosis with configurable access, while the digital inputs support local time stamping of signal changes for high accuracy sequence-of-events logging.

Hot-Swap and redundancy of the S880 I/O will increase the system availability and allows maintenance activities without process interruption.





—
Control Diagram Editor: connecting functions, function blocks and control modules on one page

Control Builder Safe - Engineering Tool
The object oriented engineering environment with SIL compliant function libraries efficiently supports the entire safety lifecycle. The engineering environment includes safeguards against non-SIL compliant configurations. The engineering system will automatically limit user configuration choices and will prevent download if SIL requirements are not met.

A series of safety measures are implemented both for the downloading process and runtime environment including CRC protection on different levels, double code generation with comparison and compiler with revalidation are just a few examples of the embedded firewall mechanisms.

Specifically, the following measures for safety system engineering are included:
- IEC61131-3 programming languages
- Access control and override (force) control
- Application change report
- Application libraries and solutions

Certified Libraries
Control Builder Safe is delivered with an extensive set of predefined type solutions stored in standard libraries. These include data types, functions, function blocks and control modules that can be used to create safety applications. The SIL certified objects and functions in the standard libraries are identified with a SIL marking in the engineering tool.

All necessary SIL certified objects and functions can be found in the certified engineering libraries. Other available libraries contain some components certified for use in SIL compliant applications. See the AC 800M High Integrity Safety manual for details.

Core Functions
The Independent HI has many built in core functions that simplify engineering and ensure consistent and safe operations including:
- System security and embedded firewalls (Access Control, Confirm Operations and Force Control)
- Access control to SIL applications such as Read, Configure, Confirm or Confirm and Access Enable.
- Time tagging events to millisecond accuracy for Sequence of Events (SOE)
- Time stamped audit trails document all changes made to the system by user and change type
- System diagnostics and Difference Report

Connectivity and Interfacing
Independent HI comes complete with the connectivity modules and protocols required to connect with process panels (Modbus), other ABB Control Systems (Modbus or OPC) and 3rd party software and control systems. The non-interfering communications protocols enable read access to the safety system data for any type of display.

Diagnostics
There are extensive system and hardware diagnostics including CPU load, ethernet statistics and status of controllers, I/O, communication, power supplies etc. System status viewers provide detailed information about the health of each component.

By using different technologies in a redundant scheme (diverse redundancy) and combining with voting, software diagnostics and diverse implementation, it is possible to minimize Common Cause Failures and meet the reliability SIL 3 requirements without hardware redundancy.

Independent High Integrity Interfacing to Systems & HMI's

ABB's Independent HI safety system is perfect for those applications where the deep integration with the Process Control System is not required. Those situations include:

- "Stand alone" safety systems where no integration with a DCS is required (i.e. relay replacements)
- Safety systems where visualization will be provided by a process panel or simple HMI program
- Safety systems where visualization will be provided by one of the ABB control systems such as Freelance, ControlMaster, Symphony Plus (Harmony or Melody) or the heritage lines (i.e. Advant, MOD300)
- Safety systems where visualization will be provided by a third party DCS or PLC supplier

In any case, Independent HI delivers the same SIL3 compliance and proven track record of the 800xA High Integrity solution.

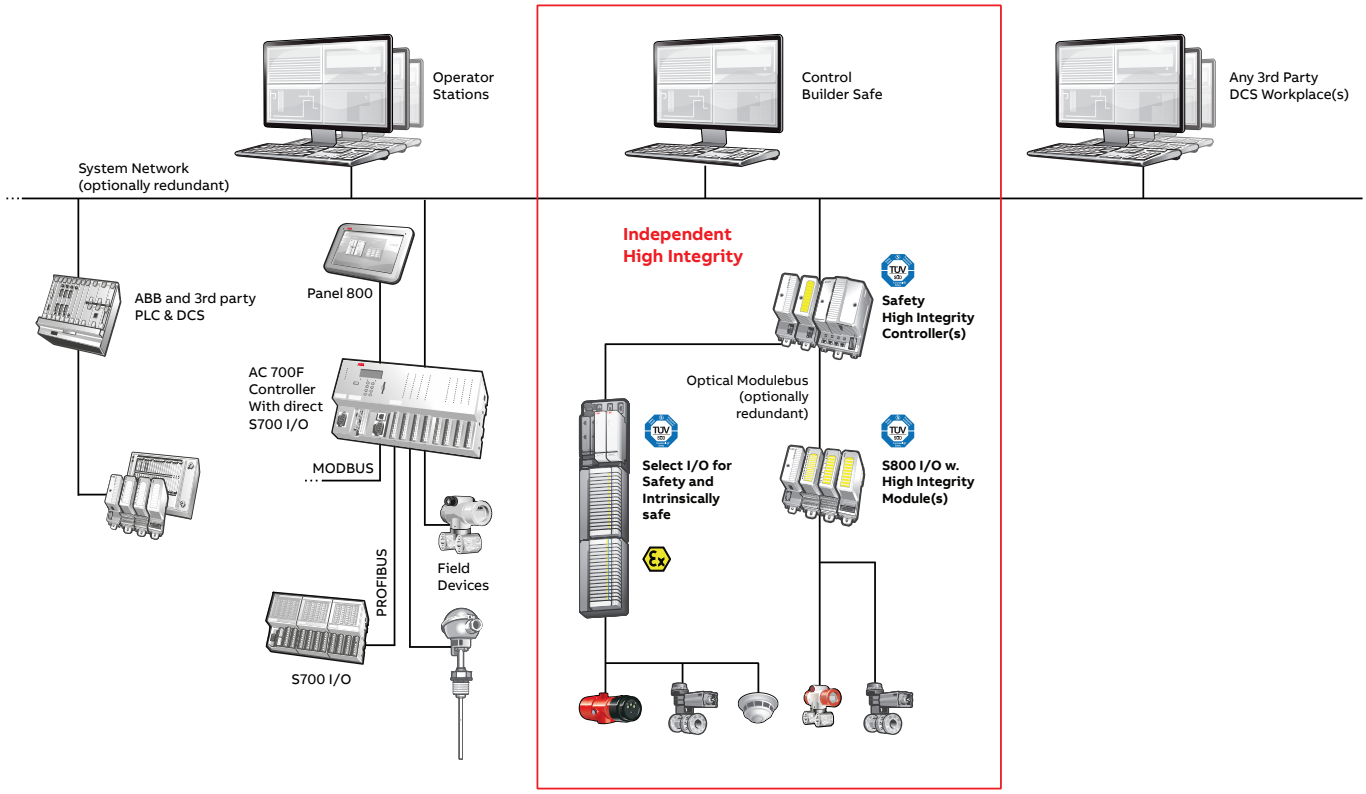
The Independent HI system comes with all of the necessary communications options and connectivity required to connect to just about any system. The connectivity options include:

- AC 800M Connect for engineering and test
- OPC Client Connection for OPC DA connectivity

Additional communications modules that have been certified for non-interference and can be used to read data from the safety system include:

- Modbus TCP
- RS-232
- Profibus DP/V1
- Masterbus 300

—
Independent HI can be used in conjunction with any ABB or 3rd party DCS or PLC



Why ABB

Experience
For over 40 years, ABB has successfully delivered and installed safety systems in more than 55 countries worldwide. With operations on all continents and dedicated safety system teams around the world.
Our portfolio of safety systems consists of standalone safety systems (Independent HI) and completely integrated control and safety systems (System 800xA HI).

Knowledge
We offer a broad portfolio of safety solutions and applications for different industries and different applications. Our safety application expertise ranges from Burner Management systems (BMS), Emergency Shut down systems (ESD), Fire and Gas systems (F&G) and High-integrity pressure protection systems (HIPPS) among others. Additionally ABB follows best practices in Functional Safety throughout the design, installation and commissioning of project, majority of which are also certified by independent safety assessors.

Cyber Security
ABB`s comprehensive approach to cyber security addresses both customer needs, industry standards and internal development processes. This ensures a secure safety system by including risk mitigation system features on identified potential risks.

Service
ABB provides not only highly qualified technical resources during project delivery, but also ensures competent local support and service in operation. We work hard with end-users to maintain and evolve existing installations, thereby maximizing customer value and ensuring safe plant operation.

Life cycle
Many existing safety systems are not compliant with today's safety standards and lack the basic functionality and compatibility with other process control systems and related applications needed to sustain the availability of your plant. ABB's Safety Evolution process can help you get there. A modern safety system like ABB's Independent HI or System 800xA High Integrity, meets all the current standards, but unlike previous certified systems, it can meet SIL3 without the need for redundancy or voting. Evolution to High Integrity will enable you to be safe, secure and compliant while still transforming your operation to meet your business goals.

solutions.abb/independenthi800xAhardwareselector.com

3BUS095645 en D