SYSTEM 800xA HIGH INTEGRITY

Burner Management System Solution

ENGINEERED
TO OUTRUN

BURNER MANAGEMENT SYSTEM SOLUTION

With 90 years of engineering experience in burner management and over 40 years experience in designing, implementing and maintaining safety systems, ABB provides an integrated system application solution for Burner Management Systems.

E.ON Åbyverket, one of Sweden's largest bio-fuelled co-generation plants, uses ABB 800xA High Integrity safety system for BPS/BMS.

For the past eight decades, ABB has worked with clients and industry-standards organizations to improve boiler control and safety during the most hazardous operating phases of start-up and low-load operation.

The Burner Management System (BMS) solution for simple or multiple-burner boilers offers a field-proven control system for safe operation of all types of boilers, including gas-fired, oil-fired, dual-fuel (gas and oil) and coal-fired.

The 800xA High Integrity BMS safety system can be fully integrated with a System 800xA process control system. This enables common, plant-wide operations, engineering and information environments across both the Basic Process Control System (BPCS) and the Safety Instrumented System (SIS). With its latest generation 800xA High Integrity system, ABB takes the integrated approach even further by offering a seamlessly integrated solution without compromising on safety.

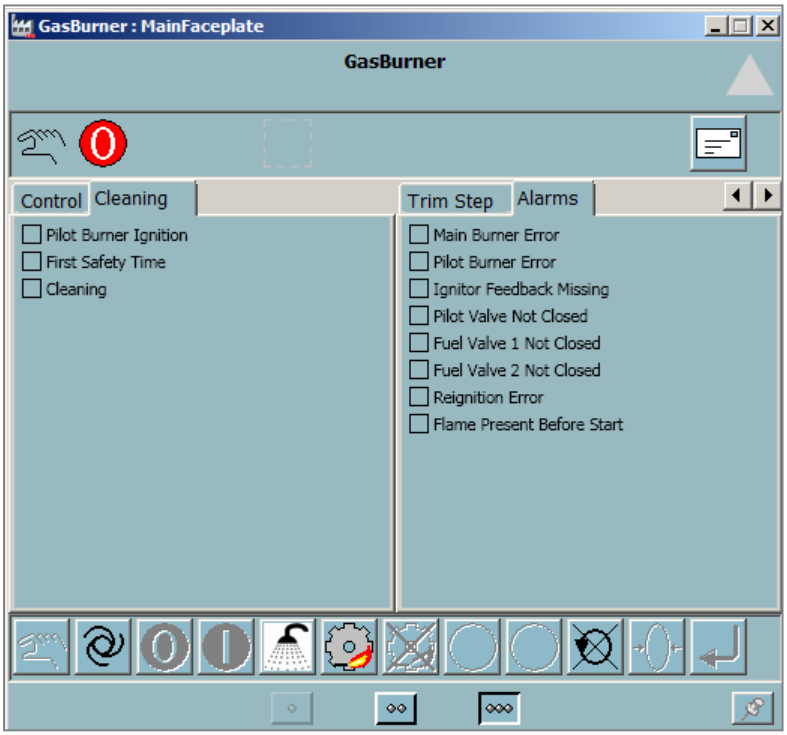
ABB Ability™ System 800xA includes a comprehensive library of standard reusable components and extended automation entities such as faceplates, graphic elements, trends, document links, and alarms and events.

The ABB Burner Management System (BMS) is designed to prevent boiler explosions, and to improve plant operation by providing safe and reliable:

- Start-up (Continuous demand)
- Operation (Low demand)
- Process and emergency shutdowns

A BMS can be from a simple boiler to a complex, multi-burner process-fired heater unit or power generation boiler. It can control different boiler and fuel types.

In addition, ABB provides a broad family of safety certified libraries that contain Function Blocks, Data Types and graphic elements with special features for building BMS applications. Including a Burner Library with purposely designed and TÜV certified functions for burner management applications. The 800xA standard libraries are fully compliant with the currently applicable National Fire Protection Association, NFPA 85 Standard.



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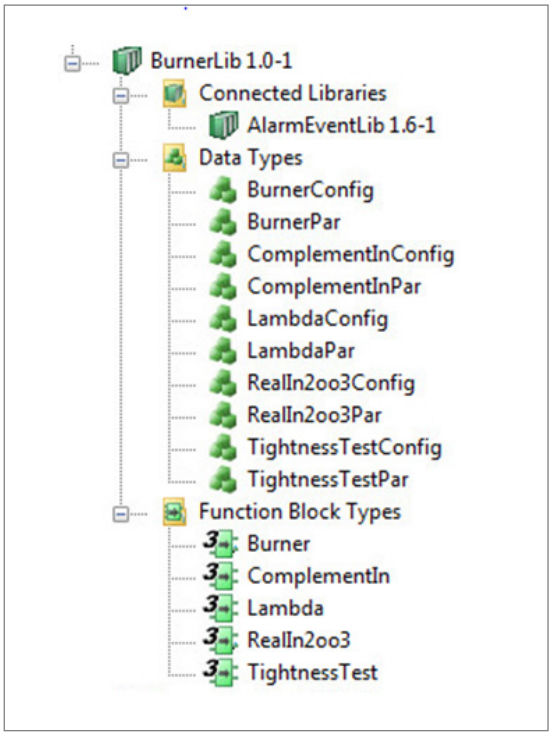

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01 Predefined descriptive graphic displays of common objects speed up engineering work.

02 Function blocks with SIL-levels clearly indicated in the engineering environment.

Safety remains paramount when installing a BMS for a boiler. Boiler or furnace protection against abnormal conditions, safety interlocks for normal start-up and shut-down, and flame safety applications are fundamental measures for protecting people, equipment and the environment. ABB provides certified building blocks for BMS applications. This enhances functionality, increases safety, and greatly simplifies the engineering process.

Certified Libraries

The Burner Management Library for 800xA contains TÜV certified functions for burner management applications to be used together with the AC 800M High Integrity.

The resulting AC 800M High Integrity BMS safety system is SIL 3 capable and fullyintegrated with a System 800xA process control system. This enables common, plantwide operations, engineering and information environments.

By using this library the user not only avoid the use of a third party “black box” isolated from their process control system but while maintaining the safety of their installation will also improve operation and maintenance, reduce engineering effort including effort to document and certify the application with the appropriate certification agencies.

ABB offers a wide range of ready-made types for monitoring and controlling safety systems. A complete range of high-level types, face-plates, graphic elements, alarm management and operational templates and strategies are included.

Enable and reset Override Control functionality is built into the types to supervise the use of overrides (Force, Inhibit, Disable) in safety applications. All modules can be used in SIL 2 or SIL 3 classified applications.

A Burner Management System is defined as the field devices, logic system, and final control elements 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 fuel preparation and burning equipment.

BMS applications are found in different industries including Power Generation, Thermal Power Plants, District Heating, Pulp and Paper, Chemical and Petrochemical, Refining and Upstream Oil & Gas production.

The ABB Burner Management System is also certified for EN298, EN1643, EN13611 and EN676 by Danish GAS Technology Centre A/S (DGC), a Notified Body under GAD.

The Burner Management System is developed in near cooperation with end users and persons who tests and approves burner control systems. It is well proven in use and after commissioning and engineering it will be easy to have the site approved.

SYSTEM 800xA HIGH INTEGRITY

Functionality

Diverse Technology for Maximum Reliability
The AC 800M HI offers a SIL3 TÜV certified control environment for combining safety and business critical process control in one controller without sacrificing safety integrity. The AC 800M High Integrity controller is realized by combining different technologies in the processor module and the Safety Module (co-processor).

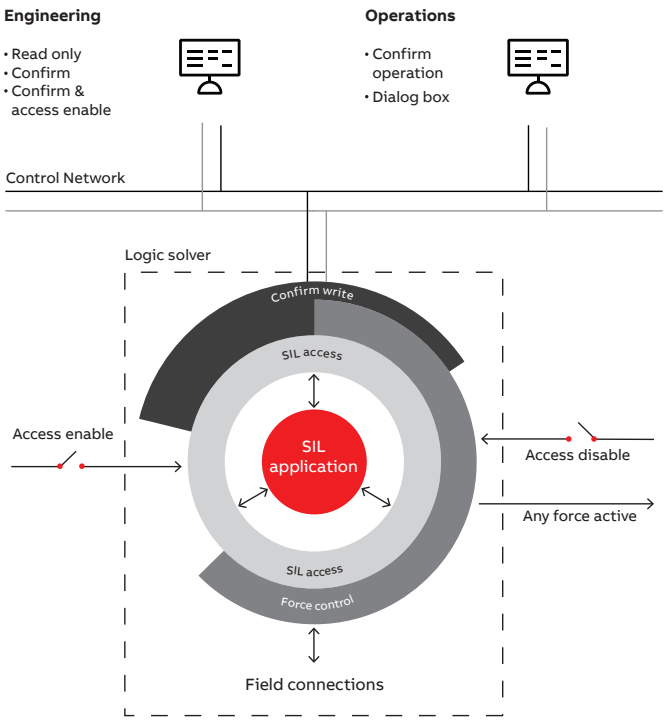
Fault Tolerance for Maximum Availability
Flexible redundancy schemes enable controller configurations up to and including Quad configuration. Libraries are marked non-SIL or SIL to show their usability. Embedded safety measures prevent inadvertant degradation of safety applications.

Flexible Integration to 800xA
800xA High Integrity and System 800xA utilize common engineering tools as well as operator interface, historian, audit trail, asset and device management applications and instruments. This enables system-level tools and functions to be leveraged across an entire integrated plant automation solution, including the safety system. Such an environment offers safe and instant interaction between applications, which leads to a host of benefits, including easier handling through better technical solutions and reduced cost of ownership throughout the system life cycle.

Process control and safety systems can be seamlessly integrated in System 800xA.

Access Management
Access Control, Confirm Operation and Force Control are all firewall mechanisms embedded within the safety controller. Access control to SIL applications includes functionality for configuration, operation and maintenance. In accordance with several safety standards, a physical input implemented as a hard-wired signal to the safety controller must be activated to enable the highest level of authorized access. When the Access Enable input is actived, permission is given to make online changes in a SIL application.

High Integrity I/O
System 800xA's S800 I/O is a distributed, highly-modular and flexible I/O system that allows easy installation of I/O modules and process cabling. SIL3-compliant High Integrity I/O modules within the S800 I/O family can be used for safety-critical applications. These I/O modules include those for 4-20 mA analog inputs, 24 Vdc supervised digital inputs and 24 Vdc digital outputs. The digital output module provides both Normally Energized and Normally Deenergized outputs typically used in ESD and Fire & Gas (F&G) systems respectively. The digital inputs support local time-tagging of signal changes for high-resolution sequence-of-events logging. Analog inputs support HART pass-through for easy calibration, monitoring and diagnosis with configurable access when using HART device integration.



01 Embedded firewalls and confirmation procedures protect the SIL application from inadvertent/accidental control actions.

02 ABB Burner Management System is certified for EN298, EN1643, EN13611 and EN676 by Danish GAS Technology Centre A/S (DGC).

03 AC 800M High Integrity controller is SIL3-certified both in single and redundant configurations, and connects to a range of safety-certified instruments.

Force Control

Force Control in the 800xA High Integrity system has been implemented to support all operational, engineering, maintenance and management activities throughout the system life cycle. When designing SIL applications, the safety engineer defines the maximum number of concurrent forced inputs and outputs.

During operation and maintenance, the Access Management software restrict access to SIL applications to prevent unauthorized changes, additionally keeps track of the active number of forced I/O points. This information can be made available via the safety operator's personalized workplace. For emergency reset of all forces, a firmware function that includes a dedicated physical input is available in the safety controller. This complies with regulatory requirements and reduces time-consuming application design, implementation and testing.

High Integrity Instrumentation

ABB can provide a wide range of safety-certified sensors and positioners. Various solutions are available ranging from full-redundancy, high-integrity transmitters designed and certified by TÜV to comply with IEC 61508 requirements to standard transmitters with enhanced internal diagnostics to minimize the Probability of Failure on Demand.

SYSTEM 800xA

Functionality

Functional Safety Management via Aspect Objects platform

The framework of the 800xA High Integrity system environment is built on ABB's Aspect Object technology. Managing data within this singular virtual database environment, System 800xA makes all the information required to install, operate and maintain the system available through a common interface. This makes it possible to access data (aspects) directly from its source in the context of the asset (object) without needing to know where the data comes from, and without concerns about data integrity and concordance.

System 800xA's system platform opens new perspectives during the design and realization of safety and control applications, as well as during Functional Safety Management (FSM) and other safety-related support functions.

For example, safety aspects could include hazardous operation studies, safety-requirement specifications, safety allocation specifications, SIL Assessments, installation and test support, maintenance, modifications and change management, configuration management as well as SIL monitoring, validation and verification.

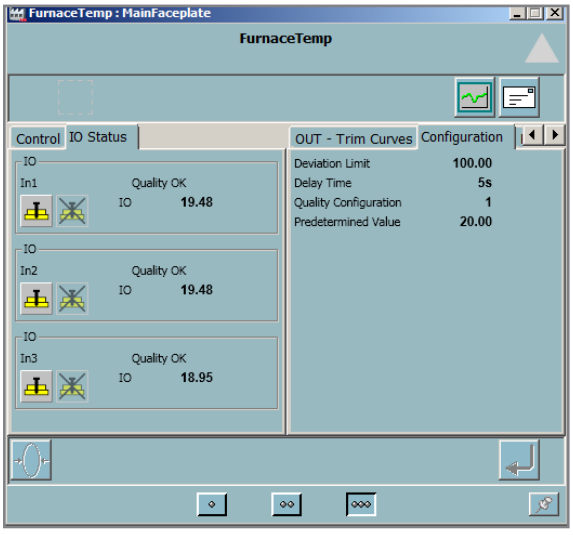
Sequence of Events (SOE) and Alarms

Alarms and time-tagged Event messages are stored and presented with milli-second accuracy in alarm lists and SOE displays. This standard feature of the 800xA system constitutes a powerful tool to quickly identify the root cause should a shutdown or hazardous event occur. In an integrated BPCS and SIS system configuration, common SOE handling across the process control and safety systems enables faster and safer process start-up in the event of a shutdown.

Messaging

Remote personnel are notified of critical events via mobile telephones, e-mail accounts and pagers by the system's SMS (Simple Messaging Service) and e-mail messaging service. Using GSM (Global System for Mobile communications) mobile phone technology, 800xA allows remote acknowledgement of notification and confirmation of receipt.

01 Dedicated safety workplaces offer overviews as well as easy access to detailed information.



02 Recovery boilers in the Pulp & Paper industry – a typical example of safety system implementation.

800xA Information Management
System 800xA collects and securely stores business, process and safety data from all plant sources. Due to the powerful and flexible system functionality and features, this data can be analyzed and transformed into useful information, and presented to plant-users to improve operational efficiency, safety and profitability. Examples of safety compliance reports that can be created include:

- **Override Report.**
  Shows an overview of all tags that are currently in force, blocked, suppressed or in override, etc. In combination with the standard System 800xA Audit Trail functionality, the report also enables historical reviews of when or by whom a tag was blocked or suppressed.
- **Valve Verification Report.**
  Summarizes valve functionality in the system. This report contains valve operation information such as calculated valve travel time and operational status, as well as a fault-frequency report on valves and valve groups.
- **Valve Leakage Test Report.**
  Summarizes results from valve-leakage testing. The Valve Leakage Test Report can be used on all valves, both critical and non-critical. The report consists of logging pressure data for a valve after the operator has created a pressure difference across the valve.
- **Automatic Shutdown Report (ASR).**
  Validates the success of a Process Shutdown (PSD) or Emergency Shutdown (ESD). The ASR report contains an over-view of all shutdowns performed in the system, and gives the operator detailed information of cause and effect relationships, including status of the operations performed.

On-line diagnostics
Each safety controller in the 800xA High Integrity system issues detailed messages about safety-related information and problems. These are typically monitored through the operator station. This high level of diagnostics is essential for the integrity of the ESD. System Status and Asset Viewers provide detailed information about the health and location of every device in the safety system.

Personalized workplaces for safety personnel
The library modules typically used for BMS applications provide a set of easily-configured operator displays and dialogs. These displays can be organized in a hierarchical structure with an overview display for status presentations and detailed displays with object presentations. The overview display contains the status of the whole shutdown system and includes links to Cause & Effect type detail displays and shutdown level displays.

Every ESD field device connected to a safety controller has a corresponding predefined graphic display (faceplate) with real-time information and dialog with the device. Interactive operator graphics can easily be customized through the use of predefined elements and symbols.

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