

Control^{IT}

Features and Benefits

- **Scalable, cost-effective, design:** Scalability in functionality and performance optimizes each installation for the scope and task at hand.
- **Fault tolerance for maximum plant availability:** Robust design, distributed functionality and highly flexible redundancy options secure productivity, yield, and return.
- **Open architecture reduces lifecycle costs:** Industry standard fieldbus, network and data interchange protocols are supported, making it easy to integrate plant systems with AC 800M controllers.
- **Integrating, for plug-and-produce connectivity:** Industrial IT enabled Control and I/O results in easy integration with similarly certified products such as drives, motors, valves, instrumentation, and higher level applications.
- **Comprehensive maintenance features reduce downtime:** Comprehensive self-diagnostics and hot-swap capability reduce maintenance costs and increase uptime and plant productivity.
- **Flexible products for all plant environments:** Control subsystem includes a full line of industrial I/O with features including remote and local installation capabilities, small footprints, DIN-rail mounting, and a broad range of I/O types, such as intrinsically safe I/O.
- **Wide-ranging control functionality meeting all needs:** Controller software to fit all control applications, ranging from simple to complex, discrete to continuous, and basic regulatory to advanced expert applications.



Continuous productivity improvements and increased profitability are the driving forces behind the selection of today's plant automation system. Traditionally, production facilities maintained many controller subsystems; each meeting specific plant needs. However, as business goals have changed, using a scalable controller platform possessing multi-functional capabilities, adaptability to changing requirements, openness, and maximum availability, is paramount to success.

The Industrial IT System 800xA family of controllers, communication interfaces and I/O modules match the most challenging requirements in all these areas. Combined with ABB's rich experience in general and industry-specific process automation, 800xA Control and I/O products deliver powerful and versatile solutions that are equally effective for small hybrid systems as for large, integrated, automation applications, contributing to higher return on assets by improving overall production control, maximizing process availability, and minimizing maintenance.

Introduction

Industrial IT 800xA Control and I/O products extend continuous productivity improvement opportunities with options to meet all needs for control in manufacturing and processing. ABB controllers feature an extensive software library of pre-defined and user-defined control elements. These can be used to easily design simple to complex control strategies to fit any application, including continuous, sequential, batch, and advanced control. Designed from the ground up to leverage the power of industry-standard field buses and open communication protocols, ABB controllers provide a full range of controls, scalability, and fault-tolerant redundancy options. In addition, a full line of industrial I/O are offered that provide: remote and local installations, small footprints, rail mounting, and a broad range of I/O types, including intrinsically safe I/O, resulting in better control, higher output and lower costs.



800xA Control and I/O, as described in this document, provides the functionality to support the entire production facility's control requirements, from discrete and continuous to batch and advanced control applications.

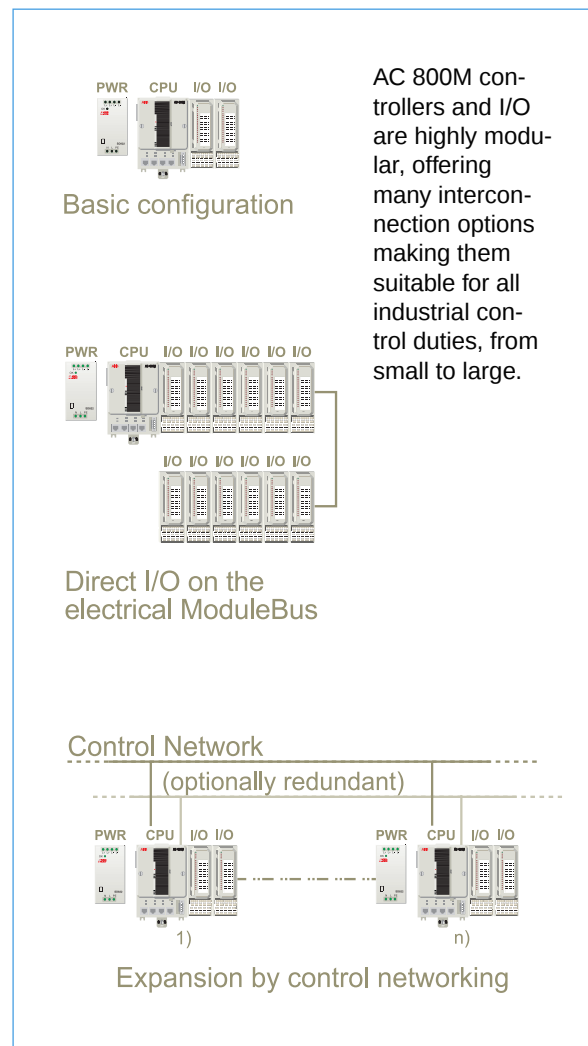
Scalable, cost-effective, design

Through its modular design, AC 800M controllers and associated I/O options contribute to lower costs, higher engineering quality and higher operating efficiency. Equally effective for small hybrid systems and large, integrated automation applications, the modularity of the sub-system results in higher return on assets by providing the flexibility to choose the specific functions required to meet the automation need. Using the same base hardware, a wide variety of Controller Processor Units (CPU), I/O, Communication Module, and power options are offered to provide flexibility in terms of functionality, performance, and size.

For example, a basic controller station consists of a power supply module, a controller, and local I/O modules. A large-scale system can consist of several AC 800M controller stations that communicate over an Ethernet-based control network. These stations may employ sub-clustered I/O assemblies connected to their host controllers locally or remotely via fiber-optic or industry-standard fieldbuses.

Redundancy at the I/O, controller and communication levels are available options, resulting in maximum flexibility. System 800xA Operations, Engineering, and other supervisory applications communicate with the controller subsystems over the same Ethernet control network. Additionally, localized communication is possible via dedicated serial links.

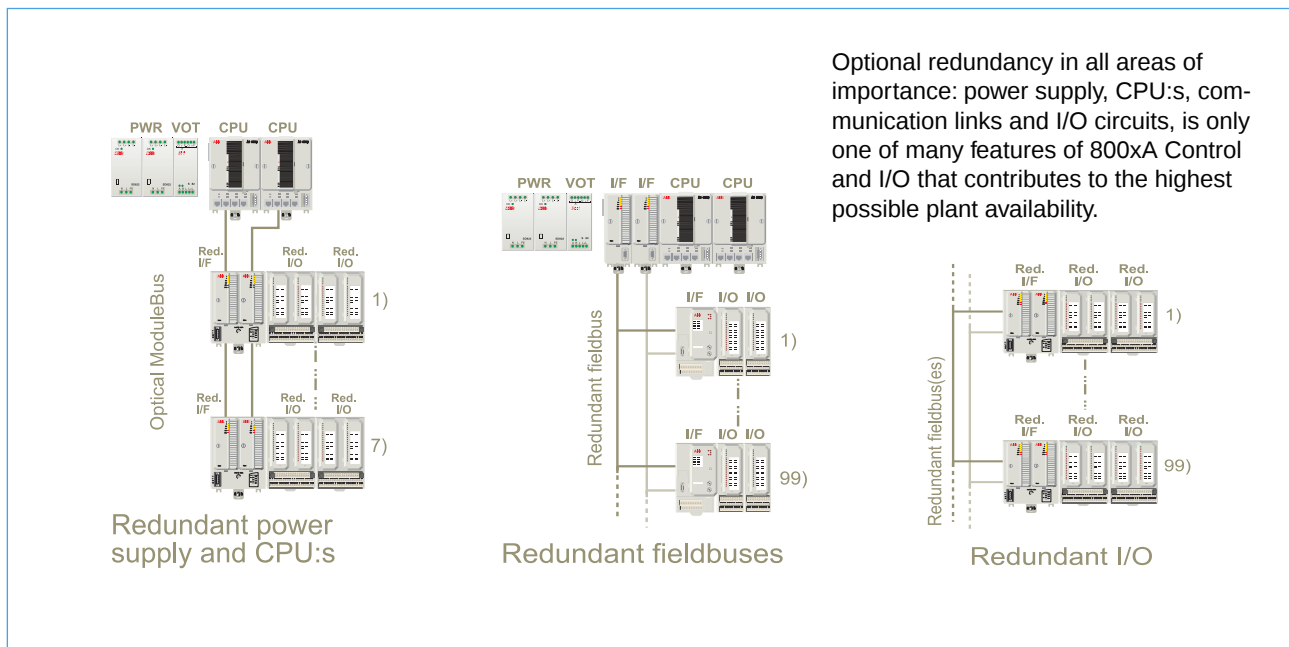
With these scalability options available, undue redundancies can be avoided, process control requirements be met by less hardware, and similar software applications be applied to all system configurations, both large and small.



Fault tolerance for maximum plant availability

The fault tolerance of AC 800M controllers and I/O results in maximum control system availability, thereby securing production and profits.

At the core, the base controller's inherent reliability features contribute to high availability. Industrial grade, conservatively loaded, on-board electronics result in a controller designed for installation in harsh environments. Low power consumption allows for installation in a sealed enclosure without requiring fans, louvers, air filters or other forced cooling techniques. The simple design eliminates many potential trouble factors and thus contributes to the controller's high reliability.



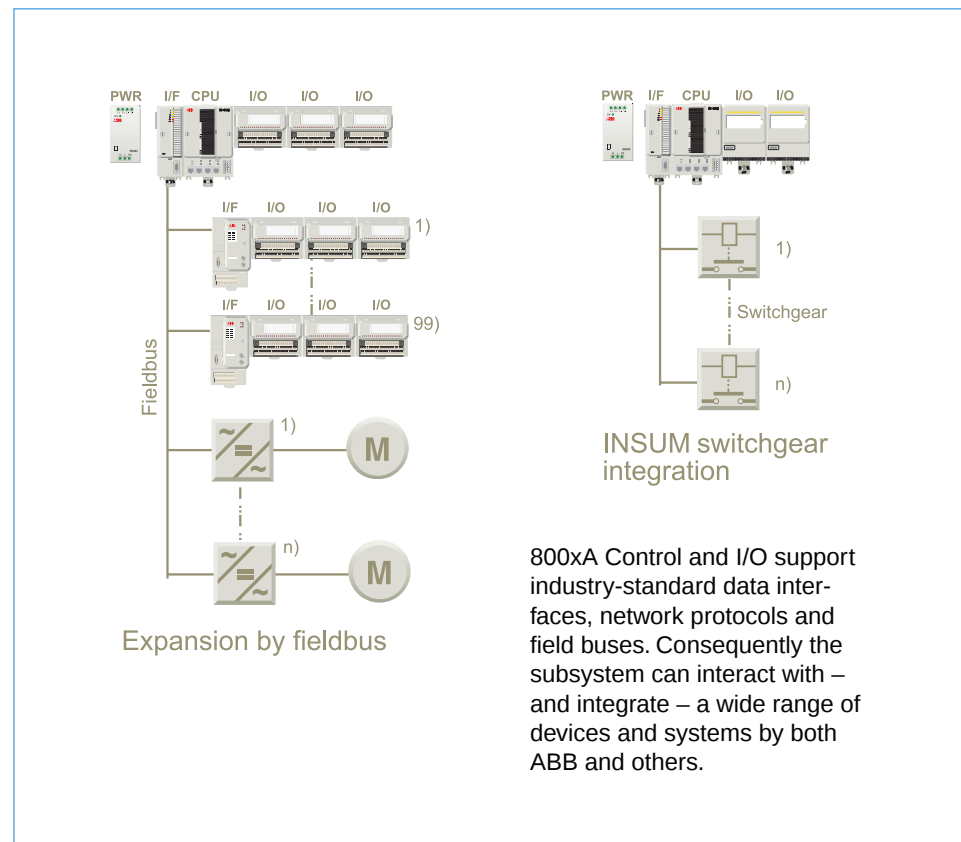
Maximum availability is achieved when the redundancy options are implemented. Redundancy is available at all critical levels of the controller subsystem. These include control networks, CPUs (including internal buses), power supplies, fieldbus media, and I/O (including internal buses). When a fault occurs in the primary controller, bumpless transfer to the back-up ensures control changeover without interruption.

Control modules, applications and hardware settings, may be changed on line, in real time, while under power, resulting in maximum control availability.

Finally, noise-immune fiber-optic communication is also available, safeguarding the operation of the control and I/O system even under the most extreme electro-magnetic conditions.

Open architecture reduces lifecycle costs

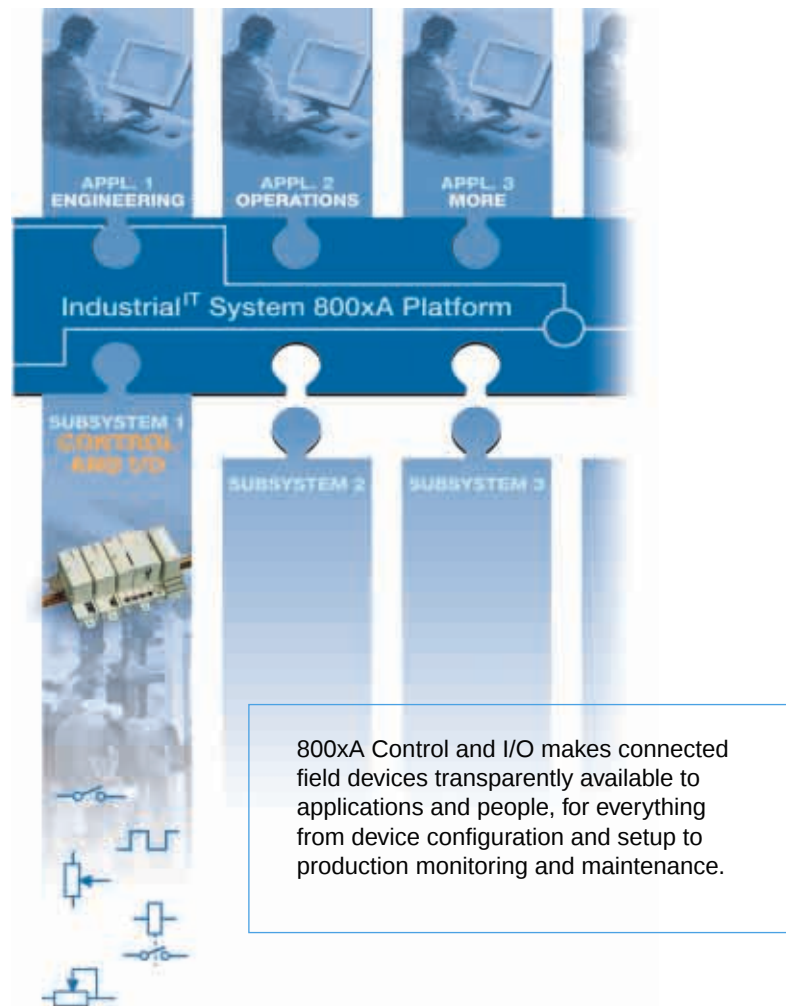
The open architecture of AC 800M controllers and I/O reduces lifecycle costs by simplifying the task of integrating plant systems and devices. Additionally, the subsystem's useful life is extended as the open architecture allows for easy integration of new commercially-off-the-shelf (COTS) applications and products. Traditionally disparate plant systems and device data are accessed via OPC, Ethernet, TCP/IP, PROFIBUS DP, and FOUNDATION Fieldbus (H1 and HSE) and its resident information used by 800xA control strategies and higher level applications to produce tighter, more reliable process control solutions.



The open design of AC 800M controllers and I/O ensures peer-to-peer communication with existing ABB distributed control systems. Communication and fieldbus options exist at both at the Controller and I/O levels.

Integrating, for plug-and-produce connectivity

AC 800M controllers and I/O seamlessly integrate traditionally isolated plant devices and systems within the 800xA system environment, extending the reach of the automation system to all plant areas. The result is a simplified, software representation of the plant, from simple on/off-type switches and valves to smart field devices, dedicated control subsystems, variable-speed drives, intelligent INSUM switchgear and popular PC-based supervisory systems.



Using ABB Aspect Object technology, all information contained within plant devices is made available and presented in a consistent, ready-to-use manner at the controller, engineering, and process visualization levels. Process objects include standard control objects such as a motor control or valve control; operator interface objects such as faceplates, trend displays, graphic elements; and engineering and maintenance support objects. In this manner, AC 800M controllers and I/O provide system applications with transparent, real-time access to all connected field devices for everything from configuration and setup to production monitoring and maintenance.

Comprehensive maintenance features reduce downtime

AC 800M controllers and I/O contribute to lower maintenance costs through a comprehensive set of self-diagnostics.

All modules are equipped with front panel LED displays that present faults and degrading performance.

Modules can report these errors to operators and maintenance personnel by alarm and event messages. In addition, 800xA system's remote SMS and e-mail messaging service notifies key plant personnel of critical conditions via mobile telephones, e-mail accounts and pagers. For information on reporting features, see 800xA Operations Overview Document.

800xA Control and I/O can be fully integrated with the 800xA's Asset Optimization features to electronically submit fault reports to the Maintenance Management system to initiate an active work order, thereby streamlining the maintenance work processes. For more information on 800xA Computer Maintenance Management System (CMMS) integration features, please refer to 800xA Asset Optimization Overview Document.

Modules can be replaced under power and are keyed to ensure replacement with the proper module type.



Modules are equipped with diagnostic LED:s and can be replaced live for ease of maintenance.

800xA Control and I/O products - Description

AC 800M Controller

The controller is in fact a family of rail-mounted modules, consisting of CPUs, communication modules, power supply modules and various accessories. Several CPU modules are available that vary in terms of memory size, power consumption, and redundancy support.

Each CPU module is equipped with two Ethernet ports for peer-to-peer communication and for interaction with operators, engineers, managers, and higher level applications. These ports can be configured for redundancy for those cases where availability is of paramount importance.

The controllers are also equipped with two RS-232C ports that can be used for point-to-point communication with programming/debugging tools and with “external” systems and devices.

To this module, a number of communication and I/O modules can be added, e.g.:

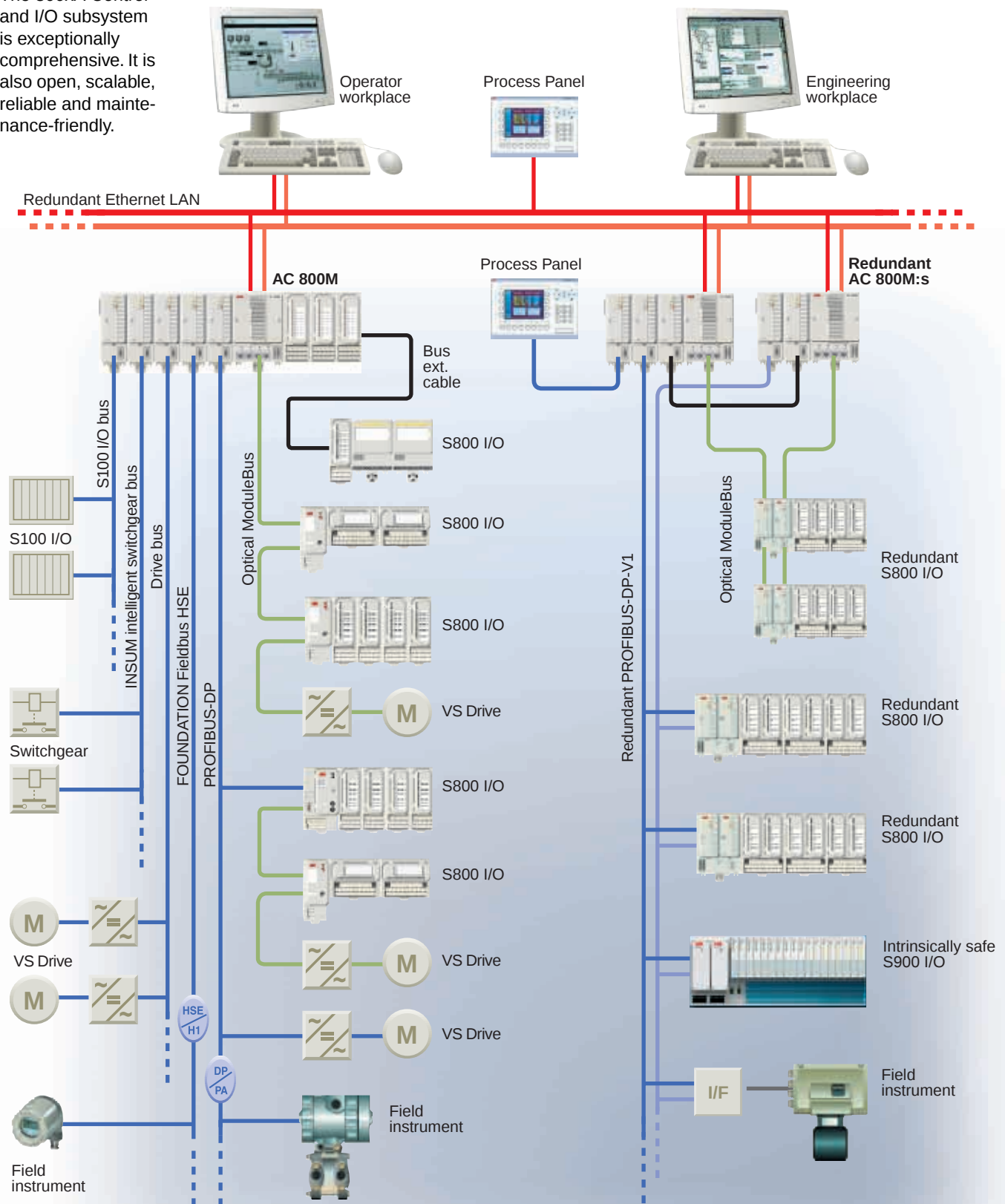
- *Additional RS-232C ports*, making it possible to connect even more “external” systems and devices,
- *PROFIBUS DP, DP-V1 interfaces*, providing integrated solutions for S200, S800 and S900 I/O systems and access to the wide range of field devices, supporting these protocols, available on the market,
- *FOUNDATION Fieldbus HSE interface*, provides a backbone for access to FOUNDATION Fieldbus system solutions,
- *ABB INSUM interface*, facilitating efficient supervision and control of electric switchgear over single few-core bus connections,
- *MasterBus 300 interface*, providing backward compatibility with Advant OCS and ABB Master systems,
- *S100 I/O interface*, making it possible to upgrade from existing Advant Controller 410 or 450 - or even MasterPiece 200 - systems to AC 800M and retain existing I/O sections,
- *I/O modules from the S800 I/O family as direct I/O*

These connectivity and expansion options make AC 800M exceptionally open and scalable, that is, easy to connect to the surrounding world of supervisory systems and intelligent devices of all kinds, and adaptable to changing requirements as the process it controls changes, expands or contracts.



With redundancy options at all practical levels, AC 800M ensures availability to meet all production requirements.

The 800xA Control and I/O subsystem is exceptionally comprehensive. It is also open, scalable, reliable and maintenance-friendly.



S800 I/O family

The S800 I/O system is closely related to AC 800M, not only in appearance but also in features.



S800 I/O is available in three different designs:
Compact, Extended and S800L.

- **Comprehensive:** The S800 family of I/O covers virtually all conceivable signal types and ranges. From basic analog and digital inputs and outputs to pulse counters and intrinsic-safety I/O.
- **Flexible configuration:** S800 I/O may be set up in a variety of ways, from directly connected to the host controller, to sub clustered using fiber optic cables, to PROFIBUS-connected. Redundancy solutions are available at all levels including; power supply, communication interfaces and I/O circuits.
- **Flexible installation:** Three mechanical designs are available:
 - *Compact* (plug-in modules with a basic I/O signal termination area),
 - *Extended* (plug in modules with ample space for I/O cable termination and jumpering), and
 - *S800L* (all-in-one modules and bases with detachable screw terminal blocks for I/O signals) for installations not requiring hot-swap capability.
- **Easy to set up:** Once station numbers have been allocated and set, all other settings can be made from a network-connected engineering tool. A pass-through feature makes it possible to configure and examine all HART®-compliant field devices in a similar way,
- **Reliable:** S800 I/O offer availability-improving features such as:
 - *Input/Output Set as Predefined (ISP/OSP).* Each input/output can be set individually to taken on a predefined value or freeze in case of communication loss.
 - *Hot swap of modules.* A faulty I/O module can be replaced live, i.e. without powering the station down and without the rest of the station being affected. A hardware key ensures that only modules of the right type can be inserted.
 - *Hot configuration in run.* An S800 I/O station can be reconfigured while in full, normal, operation, i.e. without having to switch it over to configuration mode.
 - *Redundancy options* in all areas of importance: power supply, fieldbus media, fieldbus interfaces and I/O modules.
- **Accurate:** able to time-stamp events, i.e. input signal transitions, at the source (even input signals connected to different controllers) with milli-second accuracy. Thereby providing the basis for meaningful sequence-of-events recording by the host system. In tightly interlocked processes this is an essential tool for finding the root causes of production disturbances.

S900 I/O family

The S900 I/O system is designed for use in hazardous areas to connect analog and digital field instruments and actuators. It communicates with its host control system over a PROFIBUS DP or PROFIBUS DP-V1 fieldbus network. It can be installed in hazardous areas (Zone 1 and Zone 2).

The system consists of a chassis containing an internal redundant bus and module sockets where power supply units, communication interfaces, and I/O

modules can be plugged in. Two chassis versions are available: one with space for a supply unit, a communication module and four I/O modules, intended for distributed installation in junction boxes – and one with space for two redundant power supplies, two redundant communication modules and 16 I/O modules, intended for installation in field housings, cabinets or mounting racks.

I/O modules and redundant power supply and communication modules can be replaced live, i.e. without powering the station down and without upsetting the operation of the rest of the station. Communication modules support line redundancy and full, module-and-line, redundancy.

Digital I/O modules are designed for up to eight channels and analogs for a maximum of four. Consequently, up to 128 digital or 64 analog channels – or any mix between these two signal types - are possible for each fieldbus node when using the larger chassis. Since as many as 125 fieldbus nodes can be connected to a single fieldbus network, it can contain as many as 10,000 S900 I/O points.

S900 permits direct connection of field devices over only two wires with the option of HART routing over PROFIBUS for analog transmitters.

Since no separate routing, power supply or protection is needed, the installation cost is reduced considerably. Channel-wise electrical isolation of inputs and outputs is available as an option.



The intrinsically safe S900 I/O system can be installed in Zone 1 and Zone 2 areas and offers features such as hot swap and optional redundancy.

Control Software

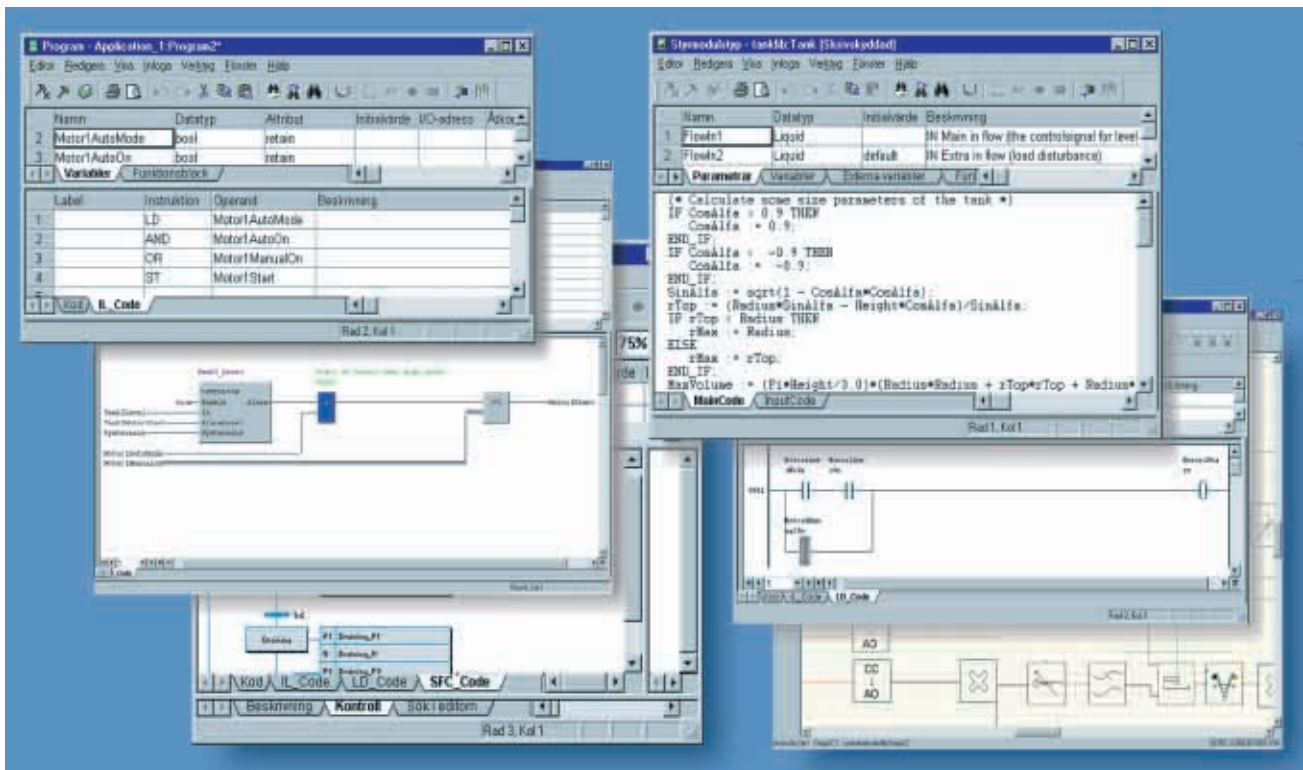
Control Software includes an extensive library of control elements, ranging from simple AND gates to powerful adaptive PID controllers, pre-defined and ready-to-use process objects and control functions e.g. for motors, valves and INSUM switchgear. It also supports user-defined control elements.

Control Software and its engineering tools support all five of the IEC61131-3 programming languages (function block diagram, structured text, ladder diagram, sequential function chart and instruction list) plus ABB's own high-powered Control Module language.

For details on controller configuration features, see the 800xA Engineering Overview Document.



With AC 800M comes an extensive library of control elements, ranging from simple AND gates to powerful, adaptive, PID controllers, including all the components required for user-friendly man-machine interaction.



Control Software and its engineering tools support all five of the IEC 6-1131-3 programming languages (function block diagram, structured text, ladder diagram, sequential function chart, and instruction list) plus ABB's own high-powered Control Module language, thereby, matching the application with the best suited language.

For the latest information on ABB visit us on the World Wide Web at <http://www.abb.com>



Automation Technologies

Västerås, Sweden

Phone : +46 (0) 21 34 20 00

Fax : +46 (0) 21 13 78 45

www.abb.com/controlsystems

e-mail: processautomation@se.abb.com

Automation Technologies

Wickliffe, Ohio, USA

Phone : +1 440 585 8500

Fax : +1 440 585 8756

www.abb.com/controlsystems

email: industrialitsolutions@us.abb.com

Automation Technologies

Mannheim, Germany

Phone +49 (0)1805 26 67 76

Fax: +49 (0) 1805 77 63 29

www.abb.de/controlsystems

email: marketing.control-products@de.abb.com

3BSE034989R0001

© Copyright 2004 ABB. All rights reserved. Specifications subject to change without notice. Pictures, schematics, and other graphics contained herein are published for illustration purposes only and do not represent product configurations or functionality. User documentation accompanying the product is the exclusive source for functionality descriptions.

The Industrial^{IT} wordmark, Aspect Objects, and all above-mentioned names in the form XXXXXX^{IT} are registered or pending trademarks of ABB.

All rights to other trademarks reside with their respective owners.