ABB Ability™ System 800xA
Control and I/O Overview

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Powerful and versatile hardware equally as effective for small hybrid systems as for large integrated, automation and power applications.

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Control and I/O
Overview

AC 800M Control and I/O seamlessly integrate traditionally isolated process, power and safety devices and systems into the 800xA system environment.

This combined environment enables a simplified software representation of the plant, from on/off-type switches and valves to smart field devices, dedicated control systems, variable-speed drives, intelligent switchgear, protection relays (IED) and PC-based supervisory systems.

ABB's Aspect Object technology makes all information in plant devices available and presented in a consistent, ready-to-use manner at the controller, engineering and process visualization levels. Process objects include familiar items such as motor and valve controls. They can also include operator interface objects, such as faceplates, trend displays and other graphic elements, engineering objects and maintenance support objects.

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The Power of Integration

Digital solutions begin with the integration of field device information (configuration, documentation, process data, analytics) into the automation system. This integration is accomplished through the use of process controllers, I/O and fieldbus technologies.

Once the plant information is available to the automation system, common engineering tools, applications and operator environment create a collaborative environment that supports both operations and maintenance. System 800xA's powerful object model and integrated applications provide an efficient foundation for today's digital solutions.

Flexible I/O Solutions
System 800xA's Control and I/O portfolio has a wide variety of communication interfaces and support for the most common fieldbuses such as FF, Profibus, HART and IEC61850. Its new Ethernet I/O Network will bring the remaining hardwired I/O into the system via a standard and future-proof Ethernet network.

The new Select I/O single channel I/O complements the proven S800 multi-channel I/O technology and provides additional flexibility to match any project requirement. All available I/O options work together seamlessly in a single control system communicating with smart and "dumb" devices alike.

Intelligent Engineering
System 800xA Engineering provides a fully integrated engineering environment for development and reuse of system standards, such as incorporating control logic, operator displays, field devices, asset monitoring and maintenance support. Standard language support (IEC 61311) and extensive built-for-purpose libraries streamline engineering workflow and enhance productivity.

The new System 800xA xStream Engineering tools and workflow help address the need to reduce project time by "decoupling" automation tasks from one another (e.g., separating the field installation and testing from the application programming).

Supporting Features
System 800xA's Control and I/O provides the foundation for process, power and safety automation solutions. Key features include:
• Wide selection of communications modules for Ethernet-based fieldbus, serial and ABB equipment interfaces
• Multi-channel and single channel I/O options (including SIL rated safety I/O)
• Additional specialty and cost-efficient I/O options
• Scalable controller family with available redundancy for high availability applications
• Fault-tolerant hardware design with hot swap, HART and safety options
• Built in self-diagnostics
• Integrated engineering tools

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How System 800xA Delivers

The AC 800M controllers and associated communications and I/O options use the same base hardware. A wide variety of CPUs, I/O types, communications modules and power supply options provide flexibility in terms of functionality, performance and size. This modular approach ensures commonality of features and functionality across the portfolio.

Fault-tolerant Design
Fault tolerance gives maximum availability. Robust design and redundancy options in all critical areas of the controller and its components eliminate single point of failures and secure maximum availability.

Self-diagnostics
Modules are equipped with self-diagnostics in the software. This reports faults to the system where alarms are raised and forwarded to operations and maintenance engineers. All modules are equipped with LEDs on the front, indicating functions and malfunctions in real time.

Online Upgradeable
Updating to the next version is supported by upgrade/update tools which minimize manual interaction and risk of downtime of the plant. Latest system enhancements include an installer-assisted online update with the system continuously controlling the plant.

Hot Swappable Modules
A faulty I/O module can be replaced live, without powering down the station and without the rest of the station being affected. A hardware key ensures that only modules of the right type can be inserted.

DIN Rail Mountable
Rail-mounted modules include CPUs, communication modules, power supply modules and accessories. Connectivity and flexible expansion options make AC 800M exceptionally open and scalable, easy to connect and easy to adapt according to current control needs.

Low Power Consumption
Low power consumption allows for installation in sealed enclosures without requiring fans, louvers, air filters or other forced cooling techniques.

Certifications and Standards
General specifications include international certification and compliance: CE Mark, G3 (ISA-71.04), EMC, UL508 (IEC/EN 61311-2), TUV (safety versions), Hazardous Locations (by module type), RoHS, WEEE. See www.800xAhardwareselector.com for certifications by module.

AC 800M Controller Family

Through its modular design and integrated engineering tools, the AC 800M controllers contribute to lower costs, higher engineering quality and enhanced operating efficiency.

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AC 800M Controllers

The AC 800M is 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 processing power, memory size, SIL-rating and redundancy support.

Each CPU module is equipped with two Ethernet ports for communication with other controllers 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. It is also equipped with two RS-232C ports that can be used for point-to-point communication with programming/debugging tools and with third-party systems and devices. A flash memory card can be inserted into a slot in the CPU module to store the application and data.

Communications Options
The AC 800M controller family includes a selection of communications modules that make it possible to access a wide range of field devices and third-party systems. The interfaces include:
• Ethernet-based interfaces / protocols
• Serial communications
• Interfaces to ABB equipment
• Communication interfaces to heritage systems

Intelligent Engineering for Control and I/O
System 800xA's integrated engineering tools provide the familiarity of standards-based programming (IEC 61311) as well as the flexibility and efficiency of a library-based approach for reusable programming components such as graphics, control logic elements and even unit configurations. A single engineering workplace provides a common portal for engineering, installation, operations and maintenance of the 800xA system.

Name	Redundancy	High Integrity	Performance	Memory
BC810K02	●	●	Hot swap supported	
BC820K02	●		Hot swap supported	
PM851AK01			0.46 ms	12 MB (from 800xA 5.1 FP4)
PM856AK01			0.46 ms	16 MB (from 800xA 5.1 FP4)
PM857K01		●	0.17 ms	32 MB
PM857K02	●	●	0.17 ms	32 MB
PM858K01			0.36 ms	16 MB
PM858K02	●		0.36 ms	16 MB
PM860AK01			0.23 ms	16 MB (from 800xA 5.1 FP4)
PM862K01			0.18 ms	32 MB
PM862K02	●		0.18 ms	32 MB
PM863K01		●	0.17 ms	32 MB
PM863K02	●	●	0.17 ms	32 MB
PM865K01		●	0.17 ms	32 MB
PM865K02	●	●	0.17 ms	32 MB
SM811 (for PM865)	●	●	-	32 MB
PM866AK01			0.09 ms	64 MB
PM866AK02	●		0,09 ms	64 MB
PM867K01		●	0.09 ms	64 MB
PM867K02	●	●	0,09 ms	64 MB
SM812 (for PM857, 863, 867)	●	●	-	64 MB
PM891K01			0.043 ms	256 MB
PM891K02	●		0.043 ms	256 MB

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01 AC 800M with
CI modules on left
hand and I/O module
on the right

—
02 PM867 controller
with a SM812 module
on left side.

Scalable
Equally as effective for small hybrid systems as for large, high availability, integrated automation applications, the modularity of the subsystem results in higher return on assets by providing the flexibility to choose the specific functions needed to meet actual requirements.

Using the same base hardware, a wide variety of central processing units (CPUs), I/O, communication modules and power-supply options is offered to provide flexibility in terms of functionality, performance and size.

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

On-board Communications
The AC 800M family of controllers come with several communications interfaces built into the main controller module. These interfaces include four RS-232C ports, a communication expansion bus connector for CEX-Bus and the Electrical ModuleBus for connection of the local I/O communications bus.

Battery-backup
The AC 800M controllers (except the PM891) come standard with an internal lithium battery for backup of memory and the real-time clock. In addition, standard and rechargeable external lithium batteries are available for extended battery life. System status monitoring is provided for the battery to ensure correct maintenance replacement times.

Flash Card
The application and data can be stored in a detachable flash memory to secure its contents, e.g., after a power failure or during replacement or transportation.

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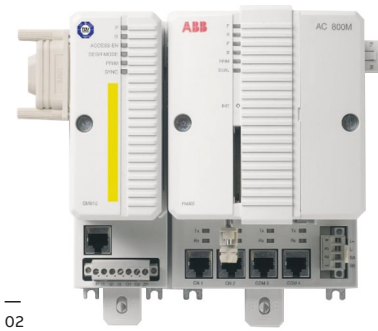
High Availability Features

While the AC 800M family of controllers covers the complete range of industries and applications, many of the controllers have additional capabilities and high availability features for the most mission-critical applications.

Redundancy
Redundancy at the I/O, controller and communication levels is available as options, for maximum flexibility and availability. System 800xA Operations, Engineering and other applications communicate with AC 800M Control and I/O over the same optionally redundant Ethernet control network.

If a fault occurs in a primary circuit, bumpless transfer to the backup ensures uninterrupted operation. Implementing all redundancy options eliminates single-point failures, thus helping secure maximum availability.

High Integrity
The AC 800M HI controllers, PM857, PM863 and PM867, offer a certified TÜV control environment for process safety applications in both integrated and stand-alone environments.

The AC 800M HI controller, in combination with a diverse co-processor, SM812, performs diagnostics and monitoring of application execution and I/O scanning. The HI controllers offer flexibility of network design as they can be used for integrated but separate safety operations or for fully integrated applications where safety and business-critical process control are combined in one controller without sacrificing safety integrity.

The SIL 3-rated, IEC 61508-certified AC 800M HI Controller is ideally suited for either.

Flexible I/O Solutions

ABB's Flexible I/O Solutions help to decouple project activities and reduce the impact of late changes

—
01 Select I/O cabinet
with small footprint

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02 Example of S800
I/O on Ethernet, Select
I/O for Process and
Select I/O for Safety

From sophisticated control strategies to simple integration of diagnostic data, System 800xA provides the integration platform that consolidates all connected process- and system-related data into a single environment at the plant's "edge."

The new System 800xA Industrial Ethernet I/O Network brings the remaining hardwired I/O into the system via a standard and future-proof Ethernet network. All available I/O options, including fieldbus technologies, serial protocols and hardwired I/O, work together seamlessly in a single control system communicating with smart and "dumb" devices alike.

While fieldbus technologies have long enabled online configuration, provided access to diagnostic data and supported "soft" marshalling and late binding, the new System 800xA single channel Select I/O brings these same benefits to hardwired I/O. This includes utilizing the same Ethernet I/O network to seamlessly integrate traditional S800 I/O.

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Digital (soft) marshalling and late binding are now available for all I/O types

Having additional hardwired I/O options means increased flexibility for control system network design as well as more efficient project execution.

Flexible I/O Solutions together with new intelligent engineering tools enable:
• Choice of right I/O for your project
• Ethernet I/O options for future-ready new projects and expansions
• Hardware-independent engineering
• Digital marshalling
• I/O cabinets placed as needed in the field
• Elimination / reduction of marshalling cabinets

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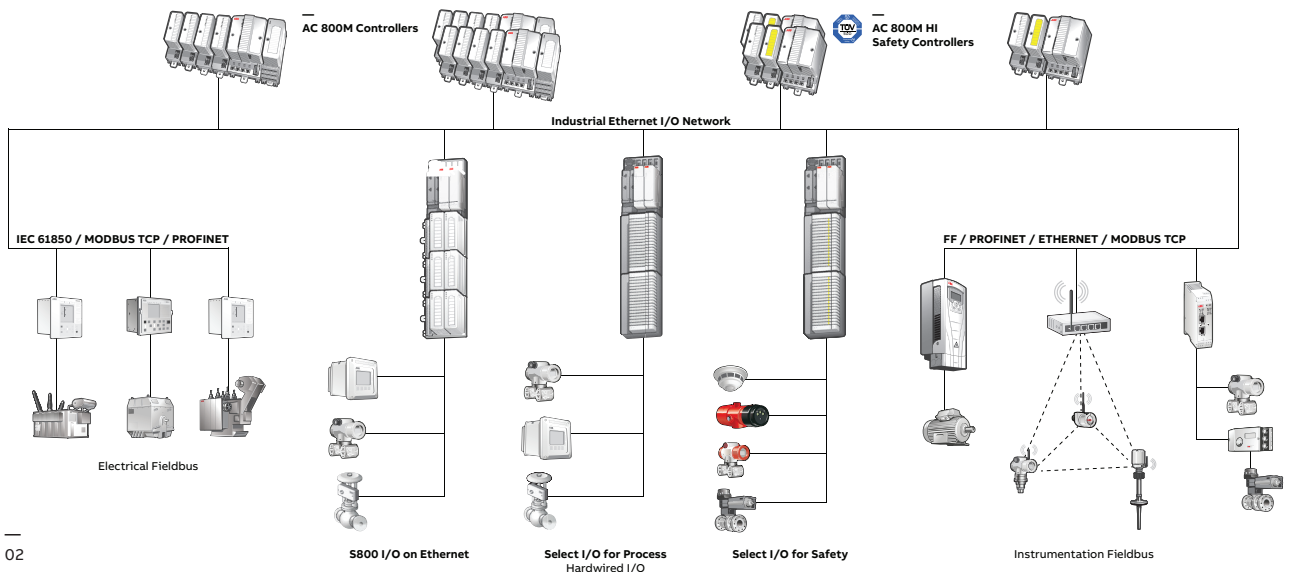
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Flexible I/O Solutions
Fieldbus Technologies

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System 800xA is designed to be the best system for integrating fieldbus solutions to meet the demanding requirements of system owners.

ABB Ability™ System 800xA has a wide variety of communication interfaces and support for the most common fieldbuses such as FF, Profibus, HART and IEC61850.

At the heart of fieldbus technology is a common theme of reducing wiring. Early fieldbus protocols (MODBUS) allowed a single pair of wires to do the job of many. Later developments allowed for analog and digital signals to be carried on the same wires used to power the device giving us protocols such as HART, PROFIBUS PA and FOUNDATION Fieldbus H1.

With the advantage of Ethernet-based communication interfaces, smart devices can be efficiently integrated into a control system with minimal wiring. They also support "digital marshalling" concepts where I/O can be configured and used in a system regardless of its physical location. As companies look to reduce project schedules and rework costs, this technology provides the flexibility not only during design and installation, but throughout the project life cycle.

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Available fieldbus interfaces

PROFINET
Like many of the other protocols looking for higher throughput capability, PROFINET now provides many of the features of PROFIBUS DP on an Ethernet backbone using the tools and seamless connectivity features already familiar to PB/DP and PB/PA users. PROFINET is one of the key networking infrastructure protocols.

MODBUS TCP (WirelessHART)
MODBUS TCP now brings the MODBUS communication protocol into the Ethernet environment, improving data communication rates to normal Ethernet speeds. MODBUS TCP will greatly enhance peer-to-peer communication applications where MODBUS is a common protocol, providing communication with third-party equipment including WirelessHART routers.

EtherNet/IP / DeviceNet
EtherNet/IP is the TCP/IP Ethernet extension of DeviceNet (and ControlNet). In addition to the speed increases achievable with Ethernet, the protocol also includes standard object and device models that simplify communication message structures. A primary application of EtherNet/IP within System 800xA provides high-speed connections to PLCs and Motor Control Centers (MCCs) that use this protocol.

IEC61850
System 800xA's IEC 61850 communication interface is the basis for integrating the electrical part of a plant including Intelligent Electronic Devices (IEDs) with process automation. It will enable users to finally optimize in real time how they use their electrical subsystems within a facility relative to the power utilization required by process manufacturing needs.

FOUNDATION™ Fieldbus (FF)
FF focuses on connecting field instruments to the controller as well as providing control-in-the-field. The integration of FF into System 800xA is based on High Speed Ethernet (HSE) and utilizes a backbone approach for connecting low-speed H1 buses to the high-speed backbone. FF offers the unique capability to fully distribute control into field devices using function blocks similar to those used in most DCSs today.
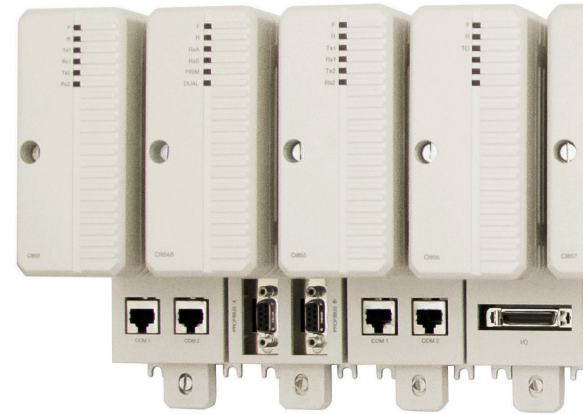
Flexible I/O Solutions
Serial Communication

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Connect up to thirteen different communication options, including fieldbuses, serial communications and ABB equipment interfaces, to a single controller for unmatched control and monitoring integration.

CI853	CI854B	CI855	CI856
COMLI & MODBUS RTU	PROFIBUS DP-V1	ABB´S Master-Bus 300	ABB's S100 I/O

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Example of software faceplate.

Serial Communications
The System 800xA connectivity and expansion options make the 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.

Several communication modules are available to support the integration of I/O and data via traditional serial interfaces:
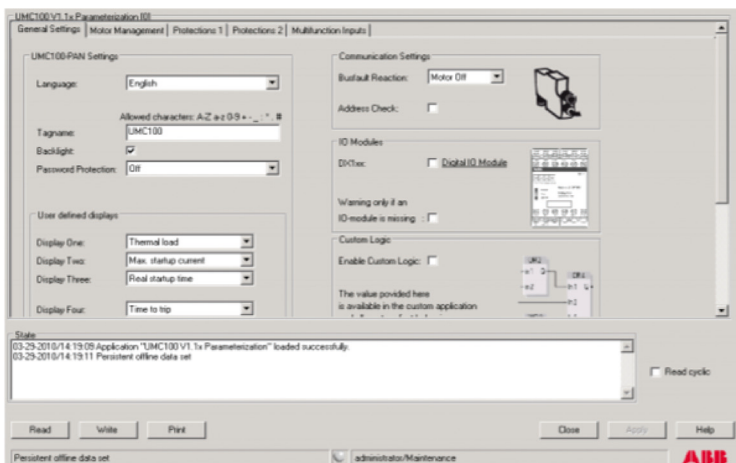
PROFIBUS DP
A core component of System 800xA control for many years, PROFIBUS DP and PA are used for many applications, including remote I/O with S800 and S900 products, connectivity to PB/PA devices like transmitters and valves, and solutions with AC and DC drives.

The PROFIBUS DP interfaces can be used to connect ABB and third-party I/O systems to the AC 800M controllers. It is possible to connect:
- S800 and/or S800L I/O
- S900 I/O
- S200 and/or S200L I/O
- Other third-party I/O communicating via PROFIBUS DP or PA

COMLI / MODBUS RTU
MODBUS (serial) has been used for more than 15 years to connect devices and remote I/Os to PLC and DCS controllers. It is used for simple peer-to-peer applications between different brands of controllers. Point-to-point applications use RS232 and RS422 communications, while networked structures for up to 32 devices use RS485. MODBUS connectivity can be done directly to an AC 800M controller on port 3 or with a CI853 module (two connections).

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Flexible I/O Solutions
ABB Equipment Interfaces

	CI857	CI858	CI860	CI865	CI867	CI868	CI869	CI871	CI873	PM 866A
	ABB´s INSUM	ABB´s DriveBus	FOUNDA-TION Fieldbus HSE	ABB´s Satt I/O	MODBUS TCP	IEC 61850	ABB´S Advant Fieldbus 100	PROFI-NET IO	ETHERNET IP / DEVICENET	AC 800M CONTROLLER

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ABB Equipment Interfaces

One of the benefits of System 800xA is the large portfolio of communications interfaces to ABB's heritage control systems and equipment.

S100 I/O
Makes it possible to upgrade from existing Advant Controller 410 /450 or MasterPiece 200 systems to AC 800M and retain existing I/O sections.

Advant Fieldbus 100 (AF100)
Provides compatibility with Advant OCS and ABB Master systems.

Masterbus 300
Provides compatibility with Advant OCS and ABB Master systems.

Satt I/O
Makes it possible to upgrade from existing Satt Controllers to AC 800M and retain existing Satt I/O sections.
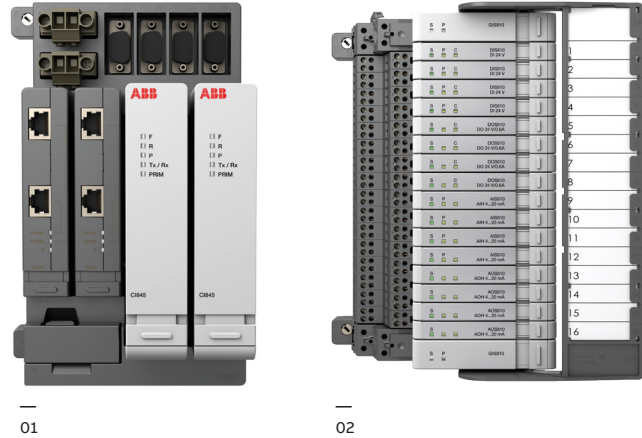
INSUM
Facilitates efficient supervision and control of electric switchgear over multi-drop bus connections.

DriveBus
Provides three optical connectors for DriveBus (ABB Drives), I/O bus and PC tools.

Flexible I/O Solutions
Serial Communication

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Select I/O

Select I/O is an Ethernet-based single channel I/O for integrating hardwired I/O and enabling features such as digital marshalling and late binding

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01 TU860 MTU with
CI845, TC810 and HI880
module.

—
02 Module Termination
Unit TUS810 with Select
I/O modules.

Select I/O is designed to provide maximum project flexibility and resilience to late changes. This single-channel I/O solution consists of several components including the Ethernet Field Communication Interface (FCI), the I/O Module Termination Unit (MTU) and the Signal Conditioning Modules (SCM). The Ethernet FCI enables both the Select I/O single channel modules and the traditional S800 multi-channel modules to be connected to the industrial Ethernet I/O network.

The Select I/O is available for both process control and process safety (SIL3). Process and safety I/O can be mixed in the same I/O system, providing additional flexibility.

Select I/O is a great solution in the high availability markets where redundancy, built-in signal conditioning and the flexibility provided by the single-channel architecture help users significantly reduce costs associated with marshalling and changes late in the project.

Select I/O Features
• Single or redundant down to the Signal Conditioning Module
• Ethernet connectivity to I/O Network
• Digital marshalling by channel
• Built-in signal conditioning
• Channel-to-channel galvanic isolation
• Loop supervision for all I/O types
• Hot swap
• LED status indication
• HART pass-through
• SOE with 1 ms resolution (DI)
• SIL3 certified AO module

• Built-in field disconnect
• HART device variables to the application

Communication
Communication between the new Select I/O and the industrial Ethernet I/O network is managed by the 100 Mbit/s built-in two-port switches on the Ethernet FCI. The available cable connections are RJ45 (copper). Any AC 800M controller can communicate with any Select I/O cluster by simply adding a CI871 communication module.

This means that any system controller (with a CI871) can communicate with all Select I/O hardware on the Ethernet network, making it possible for any application program to consume any Select I/O regardless of physical location.

Architecture
With the industrial Ethernet I/O network, System 800xA can support protocols from simple daisy chain, to star to ring topologies. High availability configurations such as redundant daisy chain, redundant "ring of stars" and redundant ring provide the flexibility to handle almost any type of project requirement.
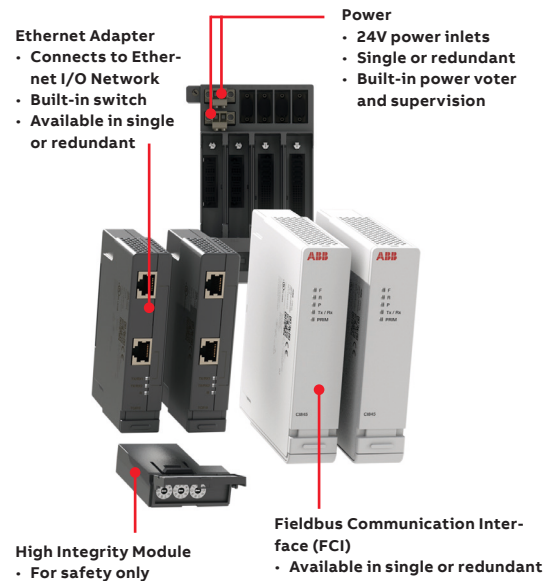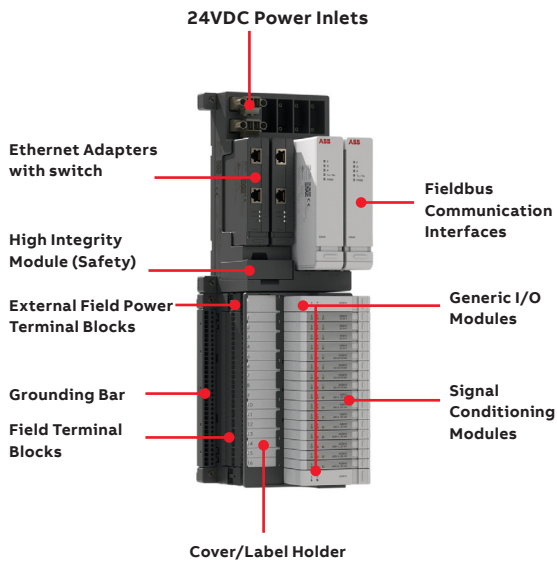
Certifications
The Select I/O hardware is designed for remote installation and has the following certifications:
• CE
• cULus ordinary safety
• cULus Class 1 Div 2 / Zone 2
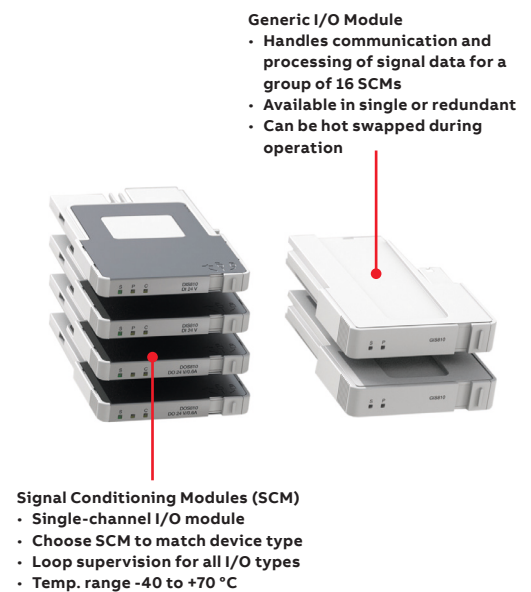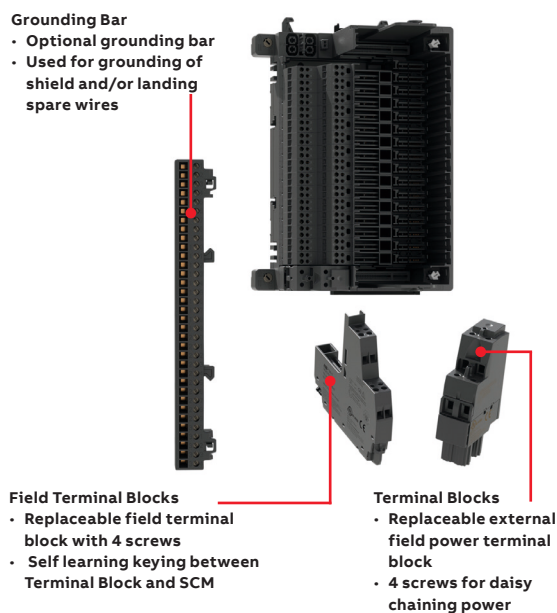• ATEX Zone 2
• SIL3 (safety I/O only)

Select I/O Details

Select I/O was designed with parallel project execution in mind. Termination units can be installed on site long before the electronics are installed. Site engineering can be done completely independently from application programming.

24VDC Power Inlets

Ethernet Adapters with switch

High Integrity Module (Safety)

External Field Power Terminal Blocks

Grounding Bar

Field Terminal Blocks

Fieldbus Communication Interfaces

Generic I/O Modules

Signal Conditioning Modules

Cover/Label Holder

Ethernet Adapter
- **Connects to Ethernet I/O Network**
- **Built-in switch**
- **Available in single or redundant**

Power
- **24V power inlets**
- **Single or redundant**
- **Built-in power voter and supervision**

High Integrity Module
- **For safety only**

Fieldbus Communication Interface (FCI)
- **Available in single or redundant**

Select I/O is made up of two main sub-assemblies – the Ethernet FCI and the Select I/O with termination unit

The Ethernet Adapter connects the I/O to the I/O network while the FCI communicates with the GIOs

Grounding Bar
- **Optional grounding bar**
- **Used for grounding of shield and/or landing spare wires**

Generic I/O Module
- **Handles communication and processing of signal data for a group of 16 SCMs**
- **Available in single or redundant**
- **Can be hot swapped during operation**

Field Terminal Blocks
- **Replaceable field terminal block with 4 screws**
- **Self learning keying between Terminal Block and SCM**

Terminal Blocks
- **Replaceable external field power terminal block**
- **4 screws for daisy chaining power**

Signal Conditioning Modules (SCM)
- **Single-channel I/O module**
- **Choose SCM to match device type**
- **Loop supervision for all I/O types**
- **Temp. range -40 to +70 °C**

Select I/O SCMs and GIOs plug into the MTU assembly, which handles the field wiring connections

SCMs perform conditioning on the field signals. The GIOs handle signal processing and communication with the AC 800M controllers

Flexible I/O Solutions
Hardwired I/O

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S800 I/O

The S800 family of I/O is a multi-channel I/O that has a comprehensive portfolio of signal types available in local, remote and redundant configurations including SIL3 certified safety I/O modules

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01 CI801 with
S800 I/O modules

—
02 S800 High
Integrity I/Os

The comprehensive S800 I/O system consists of more than 40 different module types to respond to every need. S800 I/O has close to 40 million channels worldwide.

S800 I/O Features
• Wide variety of connectivity options, from directly connected to the host controller, to sub-clustered (using fiber optic cables), to PROFIBUS-connected.
• Input/Output Set as Predefined (ISP/OSP). Each input/output can be set individually to default to a predefined value or freeze in case of communication loss.
• Hot swap of modules. A faulty I/O module can be replaced live. A hardware key ensures that only modules of the right type can be inserted.
• Hot configuration in run (HCIR). 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: power supply, fieldbus media, fieldbus interfaces and I/O modules.
• Timestamping with millisecond accuracy for SOE recording and root cause analysis.

High Integrity S800 I/O
Within the S800 family, there are SIL3 certified modules that can be used for safety-critical applications. When paired with the AC 800M HI SIL3 certified process controllers and libraries (ESD, F&G, BMS), the S880 I/O can be used in integrated, interfaced and stand-alone safety applications.

These I/O modules include those for 4 - 20mA analog inputs, 24 Vdc normally closed 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-tagging of signal changes for high-accuracy sequence-of-events logging.

S800L I/O
With its cost-effective design and shallow depth installation, S800L I/O modules are the perfect choice for PLC applications. Robust mechanics, one-piece handling, easy mounting and smart connections save your time in all phases of installation.

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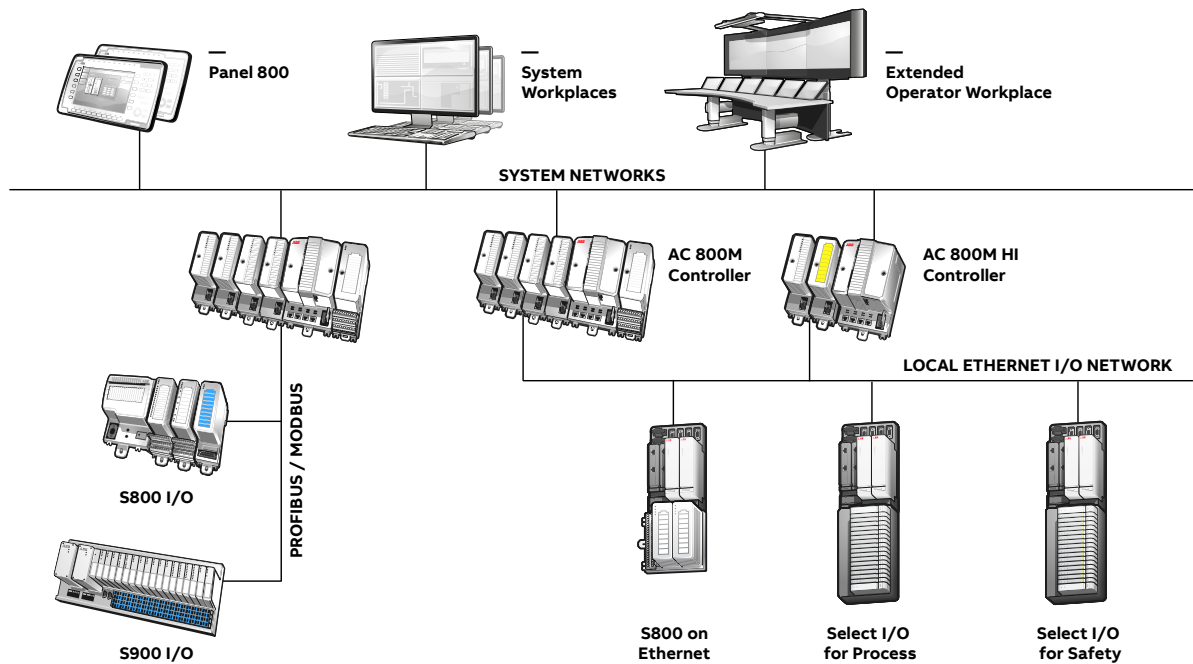
S800 has a wide range of connectivity options for communication with ABB's portfolio of process controllers and PLCs from ABB and others.

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Communication

Designed for installation in the field, close to sensors and actuators, both the S800 and Select I/O families help eliminate installation costs by reducing field cabling.

The main methods of connecting S800 I/O to an 800xA system are as follows:

Modulebus
An incremental, electrical or optical, bus for inter-connection of I/O devices. A maximum of 12 I/O modules can be connected to the electrical Mod-uleBus and up to seven clusters can be connected to the fiber optic ModuleBus. The fiber optic interface is intended for local distribution of I/O clusters and where more than 12 I/O modules are required in an I/O station. The Module Termina-tion Units (MTU) distributes the ModuleBus to the I/O module and to the next MTU.

PROFIBUS
This is the most commonly used multipurpose protocol for connecting field instruments, drives, low-voltage electrical equipment, remote I/O and various types of gateways to sensor/actor buses or proprietary communication. Accordingly, Sys-tem 800xA offers a Device Management option to take full advantage of the wealth of functionality embedded in PROFIBUS devices.

Ethernet
With the release of Select I/O comes the indus-trial Ethernet I/O network and associated engi-neering tools and workflows. This technology is also available for connection of S800 I/O to the new Ethernet I/O network using the same Ether-net FCI as the Select I/O (see image 02). The Addi-tion of this option enables up to 12 redundant I/O modules to be connected in a single cluster. Soft marshalling by I/O module is also available, enabling any AC 800M controller to digest I/O from any S800 I/O module.

Architecture
These communication options enable the S800 I/O modules to be installed locally, remotely or as part of the Ethernet I/O network. With both single and redundant options, virtually any project re-quirement can be met. See Select I/O section for additional details on the topologies available with the Ethernet I/O network.

Certifications
Classification of corrosive protection, electrical safety, hazardous location and marine certifica-tion brings the possibility to install S800 I/O in a wide variety of applications. For harsh environ-ments, all control and I/O modules are compliant to G3 severity level of ISA-S71.04, Environmental Conditions for Process Measurement and Control Systems.

Flexible I/O Solutions
Freedom of choice

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No matter the application, System 800xA has the right I/O option for your project.

Simply choose the required level of functionality and signal type for your project and architect your solution accordingly. Every I/O type delivers basic I/O functions and is seamlessly integrated with 800xA and the AC 800M controllers.
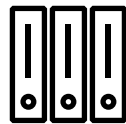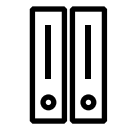
Basic Functions:
• Works natively with 800xA
• Status indicators
• Current limiting
• Diagnostics
• Hot configuration in run
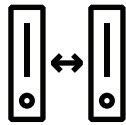
Hot Swap+:
• Hot swap of faulty modules without disconnecting field or system power

HART:
• Powers 2 or 3 wire transmitters
• Transmitter power is supervised and current limited
• HART pass-through

Redundancy:
• Modules for single or redundant applications
• Automatic switchover

**Safety:**
• SIL3 and redundant safety I/O for S800 and Select I/O
• SIL 3 digital input with SOE and loop supervision
• Digital marshalling for safety

Ethernet:
• Redundant Ethernet I/O network
• Support for S800 (process only) on Ethernet (soft marshalling)
• SOE for digital inputs (1 ms)

Digital Marshalling:
• Connect any channel or S800 module to any controller on the I/O network
• Application program automatically "consumes" I/O
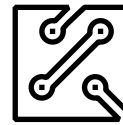
Signal Conditioning:
• Select I/O SCMs eliminate need for external relays and/or marshalling
• Loop supervision
• Built-in field disconnects and keying
• Extended temperature -40-+70 °C

Standard Cabinets:
• Supports standard remote cabinet designs
• Generic MTU for all SCMs
• Autosensing of installed hardware by Ethernet I/O Wizard

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01 Freedom of choice of I/O for System 800xA applications

Single Channel I/O $$$$$									Select I/O
Std. Cabs +$	Marshalling +$	Ethernet +$	Conditioning +$	Safety +$	Redundant +$	HART +$	Hot Swap +$	I/O Basic Functions	DIS810 DIS880 DOS810 DOS880 AIS810 DOS885 AOS810 AIS880 AOS880

		High Availability $$$$						S800R / S880R
Safety +$	Red I/O+$	Red Comms+$	HART +$	Hot Swap +$	I/O Basic Functions			DI840 AO845 AI88 DO840 DI880 AI845 DO880 I/O & Comms Redundancy

			Redundant Communications $$$					S800 w/RCI
Red Comms+$	HART +$	Hot Swap +$	I/O Basic Functions					S800 I/O families Communications Redundancy

				Multi/Channel I/O $$				S800
HART +$	Hot Swap +$	I/O Basic Functions						DI, DO, AI, AO Families: 810, 811, 814, 818, 820, 821, 825, 828, 830, 831, 835

				Monolith $				S800L
I/O Basic Functions								DI801 DO801 DI802 DO802 DI803 AI801 AO801

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S800 I/O modules, S800L I/O modules and Select I/O modules

See below all available S800 I/O, S800L I/O and Select IO modules.

S800 I/O modules	
Digital input modules	
DI810	Digital input.
DI811	Digital input.
DI814	Digital input.
DI818	Digital input.
DI820	Individually galvanic isolated channels.
DI821	Individually galvanic isolated channels.
DI825	Individually galvanic isolated channels with SOE (Sequence Of Events).
DI828	Digital input.
DI830	With SOE (Sequence Of Events).
DI831	With SOE (Sequence Of Events).
Pulse input module	
DP820	Individually galvanic isolated channels.
Digital output modules	
DO810	Digital output.
DO814	Digital output.
DO815	With wire-fault detection.
DO818	Digital output.
DO820	Individually galvanic isolated channels.
DO821	Individually galvanic isolated channels.
DO828	Individually galvanic isolated channels.
Analog input modules	
AI810	Analog input.
AI815	With HART interface.
AI820	Differential inputs.
AI825	Individually galvanic isolated channels.
Analog input modules	
AI830A	RTD inputs with wire-fault detection.
AI835A	TC inputs with open circuit detection.
Analog output modules	
AO810V2	With open circuit detection.
AO815	With HART interface and open circuit detection.
AO820	Individually galvanic isolated channels with open circuit detection
I/O modules with intrinsic-safety interface	
DI890	Individually galvanic isolated digital input channels with wire-fault detection.
DO890	Individually galvanic isolated digital output channels with wire-fault detection.
AI890	Analog inputs.
AI893	TC/RTD inputs with wire-fault detection.
AI895	Analog inputs with HART interface.
AO890	Analog outputs with open circuit detection.
AO895	Analog outputs with HART interface and open circuit detection.

| S800L I/O modules	
DI801	Digital inputs.
DI802	Individually galvanic isolated digital input channels.
DI803	Individually galvanic isolated digital input channels.
DO801	Digital outputs.
DO802	Individually galvanic isolated digital output channels.
AI801	Analog inputs.
AO801	Analog outputs.
Accessories	
TU805K01	Termination unit.
S800 I/O modules for redundancy	
DI840	Digital inputs with SOE.
DP840	Pulse counters with wire-fault detection.
DO840	Digital outputs with short circuit detection.
AI843	TC inputs with open circuit detection.
AI845	Analog inputs with HART interface.
AO845A	Analog outputs with HART interface & open circuit detection.
S800 I/O modules for SIL3	
DI880	SIL3 digital inputs with SOE.
DO880	SIL3 digital outputs with wire-fault detection.
AI880A	SIL3 analog inputs with HART interface.
Select I/O	
CI845	Ethernet FCI module
TU865	MTU for Ethernet FCI
TC810	Ethernet Adapter for Ethernet FCI
HI880	HI Module for Ethernet FCI
TUS810K01	MTU for Select I/O
GIS810	Generic I/O Module
AIS810	Analog Input 4 to 20mA
AOS810	Analog Output 4 to 20mA
DIS810	Digital Input 24V
DOS810	Digital Output 24V 0.6A
GIS880	Generic I/O Module High Integrity
AIS880	Analog Input 4 to 20mA HI
AOS880	Analog Output 4 to 20 mA HI
DIS880	Digital Input 24V HI
DOS880	Digital Output 24V 0.6A HI
DOS885	Digital Output 24V 3A HI
TB868	Modulebus Terminator
TB861V009	Compact Modulebus Extension
TB861V011	Compact Modulebus Extension
TB861V015	Compact Modulebus Extension
GTB810	Grounding Terminal Bar

Please also visit the System 800xA hardware selector for a complete list of hardware, functions and certificates.
www.800xahardwareselector.com

Flexible I/O Solutions
Hardwired I/O

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Several more I/O options are available that communicate natively with AC 800M or other controllers via PROFIBUS

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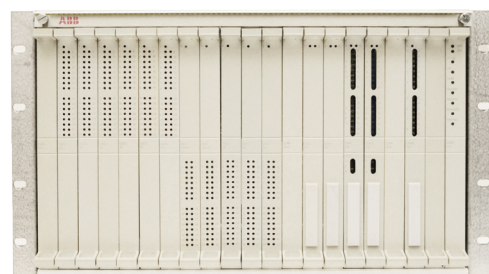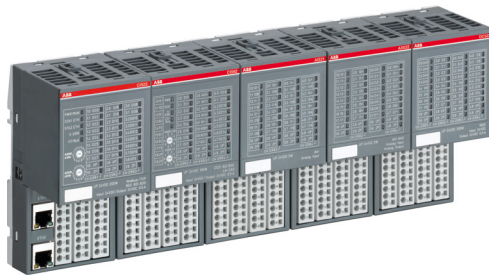
Other I/O Options

In order to ensure a robust evolution of ABB's heritage systems and to provide industry-focused functionality, there are other I/O options available that connect to an 800xA system directly or by PROFIBUS. These I/O options include:

S500 I/O
S500 I/O communicates with an AC 800M controller using PROFIBUS DP. This I/O is a good solution in price-sensitive applications when PLC functionality is suitable. The integration solution provides hardware definition libraries within the 800xA Engineering tool, ensuring a more efficient integration than using a GSD.

S900 I/O
Suitable for applications in the chemical, pharmaceutical, oil and gas industries, S900 I/O can be installed in hazardous areas, thereby reducing marshalling and wiring costs. S900 provides all input and output modules needed for intrinsically safe field signal connection. Supervisory process control systems, DCS or SCADA systems use an intrinsically safe fieldbus to communicate with the communication interface.

S100 I/O
S100 I/O communication is realized in AC 800M by communication interface CI856, which is connected to the CEX-Bus through a base plate. The baseplate, TP856, houses a ribbon connector connecting to bus extender boards in S100 I/O racks and provides a simple DIN-rail mounting. The CI856 interface offers the possibility to reuse the majority of the existing I/O installation, including terminations and field wiring in existing ABB Master and Advant OCS installations.

S200 I/O
The CI865 module is the AC 800M system's communication interface for Satt ControlNet and bridges different bus standards used on AC 800M and Satt ControlNet. The CI865 module makes it possible to use older Satt I/O system (Rack I/O and Series 200 I/O) with the AC 800M controller platform. CI865 cannot be used with a High Integrity safety controller.

Flexible I/O Solutions
Intelligent Engineering

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01 Configure,
Check, Connect

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02 Ethernet I/O Wizard

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System 800xA Engineering is designed to facilitate one-time data entry for all areas within the automation system.

Providing a single source of accurate and real-time plant information results in maximum engineering performance, quality and reliability. This integrated environment results in fewer start-up delays, reduced maintenance costs and more effective engineering practices.

800xA Engineering key features
- Graphic display configuration
- Control application design
- Safety application design
- Control system configuration
- Field device and instrumentation configuration
- Control System and field device maintenance
- Trend and history configuration

Control Builder software includes an extensive library of predefined and support of user-defined control elements, ranging from simple and gates to powerful adaptive PID controllers and ready-to-use process objects and control functions e.g., for motors, valves and switchgear. These can be used to easily design simple to complex control strategies to fit any application, including continuous, sequential, batch and advanced control.

Control Builder 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.
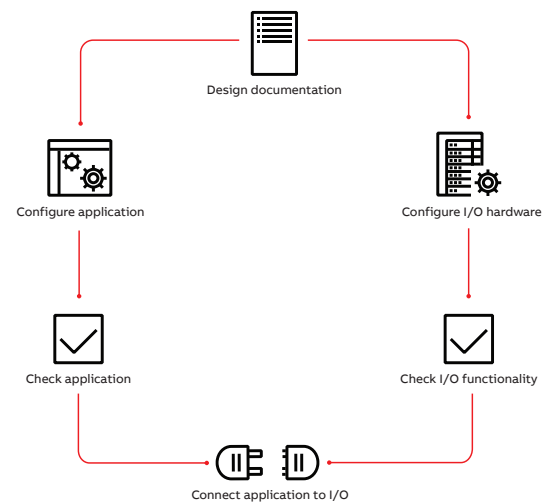

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System 800xA xStream Engineering delivers innovative tools for digital marshalling and late binding.

System 800xA engineering tools remove dependencies and enable multiple work streams. Tasks can now be done in parallel instead of the traditional way of doing projects.

xStream Engineering addresses the need to reduce project time by "decoupling" automation tasks from one another (e.g., separating the field installation and testing from the application programming). Application engineering can now be done in parallel with the installation and configuration of the hardware using the newly released "signals" concept.
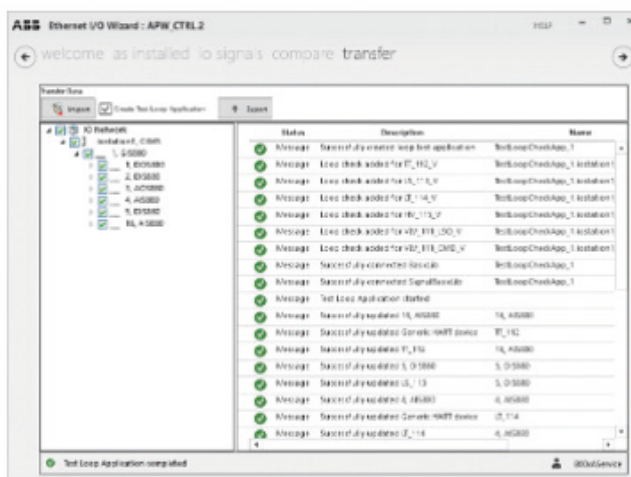
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02

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