Symphony Plus
S+ Turbine

# Symphony Plus
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For several decades, ABB has been one of the world's leading providers of turbine control systems, delivering cost efficient and technologically advanced solutions designed to meet the needs of both retrofit and greenfield markets. With Symphony™ Plus, all this experience comes together in S+ Turbine to take ABB's turbine control offering to a new level of unmatched functionality and performance.

Above all, S+ Turbine is a highly integrated total solution for the automation of all turbine types, sizes and manufacturers. It makes use of the industry's most powerful processors, along with proven digital algorithms and dedicated high-end solutions for turbine protection, valve positioning, generator synchronization, condition monitoring and mechanical/hydraulic upgrading.

Supports all turbine types, sizes and manufacturers

S+ Turbine technology has been developed to take into account the strictest requirements for all types of rotating machinery, including utility steam turbines, gas turbines, industrial turbines, hydro turbines, boiler feed pumps, blowers, gas expanders and compressors.

TP800   S+ Control   VP800

Governor response time
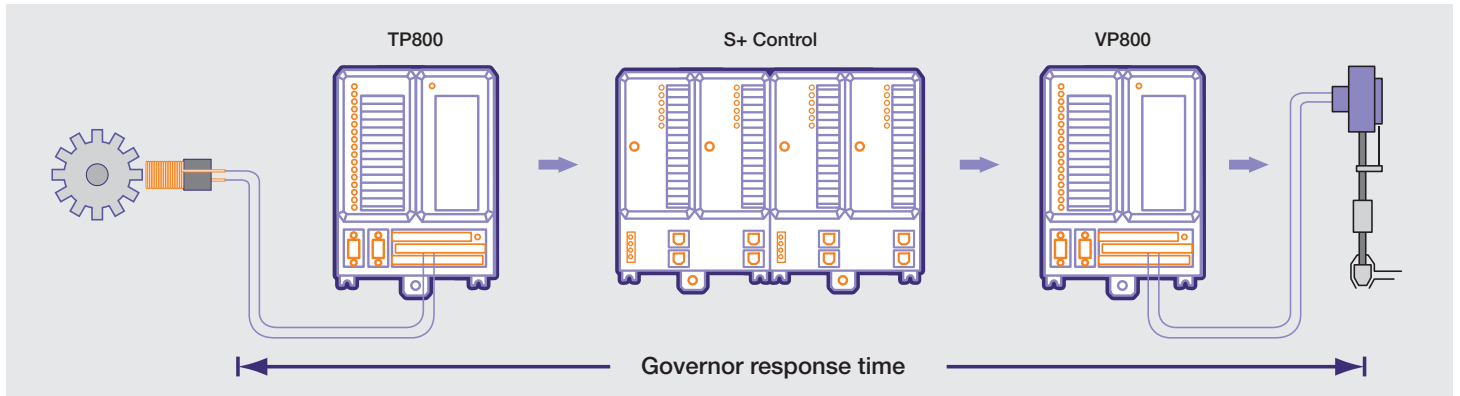
The specific features built into the S+ Turbine components are a direct reflection of ABB's diverse and in-depth knowledge and experience in automating the turbines of all major manufacturers. S+ Turbine has been designed to handle all turbine sizes, from a few kilowatts to more than 1,000 MW.

Symphony Plus infrastructure

Symphony Plus represents the new generation of the field-proven Symphony family of control systems with more than 6,000 systems installed worldwide. S+ Turbine is a key part of the Symphony Plus technology family, offering tight integration into S+ Engineering, S+ Operations and S+ Control. These environments provide the necessary libraries, faceplates, symbols, function codes, interfaces and graphics necessary for the design, configuration and operation of the entire turbine control system, including the S+ Turbine Specialty Modules. There is no need for additional tools, interfaces or related training. In addition, the tightly integrated Symphony Plus infrastructure eliminates any need for local configuration or calibration of the turbine control system components.

Unmatched overall capability and performance

S+ Turbine offers all the advantages of the Symphony Plus DCS platform, including unmatched flexibility, scalability, CPU power and communication speed. It is this high-performance infrastructure, in combination with the S+ Turbine Specialty Modules, that makes up the governor system. The end result is tight turbine speed and load control, offering closed loop response times under 20 milliseconds, as measured from the physical speed input to the physical servo output.

High-end turbine protection

S+ Turbine is the only DCS turbine control system to offer a true turbine protection module (TP800), which in addition to overspeed protection is also able to perform secondary protection functions such as power load unbalance, load drop anticipation, acceleration protection and trip anticipation. Other DCS vendors implement these protection functions inside their main controllers, sacrificing reliability and response time.

The overspeed protection functionality comes with 2oo3 redundancy, fast response time (OSP protection < 8 msecs), online testability and SIL 3 certification from TÜV.

For an optimal high integrity turbine protection solution, S+ Turbine can be complemented with ABB's SIL 3-rated hydraulic trip manifold, a state-of-the art 2oo3 fail-safe device designed under the stringent stipulations of IEC 61508.

Symphony Plus
S+ Turbine

Industry's most capable valve positioner

S+ Turbine includes a fast-acting valve positioner (VP800) capable of interfacing with all major types of servo valves, I/H converters and position feedback devices. Its control algorithm provides response times under 3 msecs and is complemented by numerous advanced features such as automatic calibration, built-in valve testing, I/O redundancy, module redundancy, built-in valve curves and cascaded loop control.

Integrated generator auto synchronization

S+ Turbine comes with a fully integrated synchronization module (AS800) that can automatically close the generator breaker through precise matching of frequency, voltage and phase. The AS800 can be configured and operated within the standard Symphony Plus environment without any need for additional tools or interfaces.

Proven turbine control software algorithms

S+ Turbine includes a large set of turbine software algorithms for closed loop control (governor), open loop control (auxiliaries) and turbine protection. Some of these algorithms are implemented within the system controller, while others are implemented inside S+ Turbine Specialty Modules. The end result is a highly integrated and efficient set of functions, fully configurable through S+ Engineering and based on field-proven concepts (more than 1,000 turbines worldwide, more than 30 different OEMs).

Automatic startup

S+ Turbine overlays a rotor stress monitor and an automatic startup sequence over the governor base controls to consistently provide optimal startup and shutdown cycles in accordance with OEM recommendations. A wide range of automation levels can be used in order to allow for different degrees of operator involvement. The rotor stress application calculates and monitors the turbine rotor stress levels to initiate speed or load limiting actions, as needed. The key features are:
– Calculation of throttle and reheat steam temperature window
– Computing of rotor temperature and evaluation of the rotor stress (HP and IP)
– Evaluation of the allowable stress based on the different maximum cycle times
– Evaluation of the maximum allowable speed and load gradients during the transients
– Calculation of rotor thermal life expenditure (monthly, yearly and total)

Turbine auxiliaries

S+ Turbine makes use of a large variety of logic templates to interface with all motor starters and electrical circuit solenoid valves. These logic templates have been developed with circuit considerations for sustained outputs, momentary start and stop outputs, fail-safe outputs, seal-in contacts, open/close valves, valves with intermediate positions and much more.
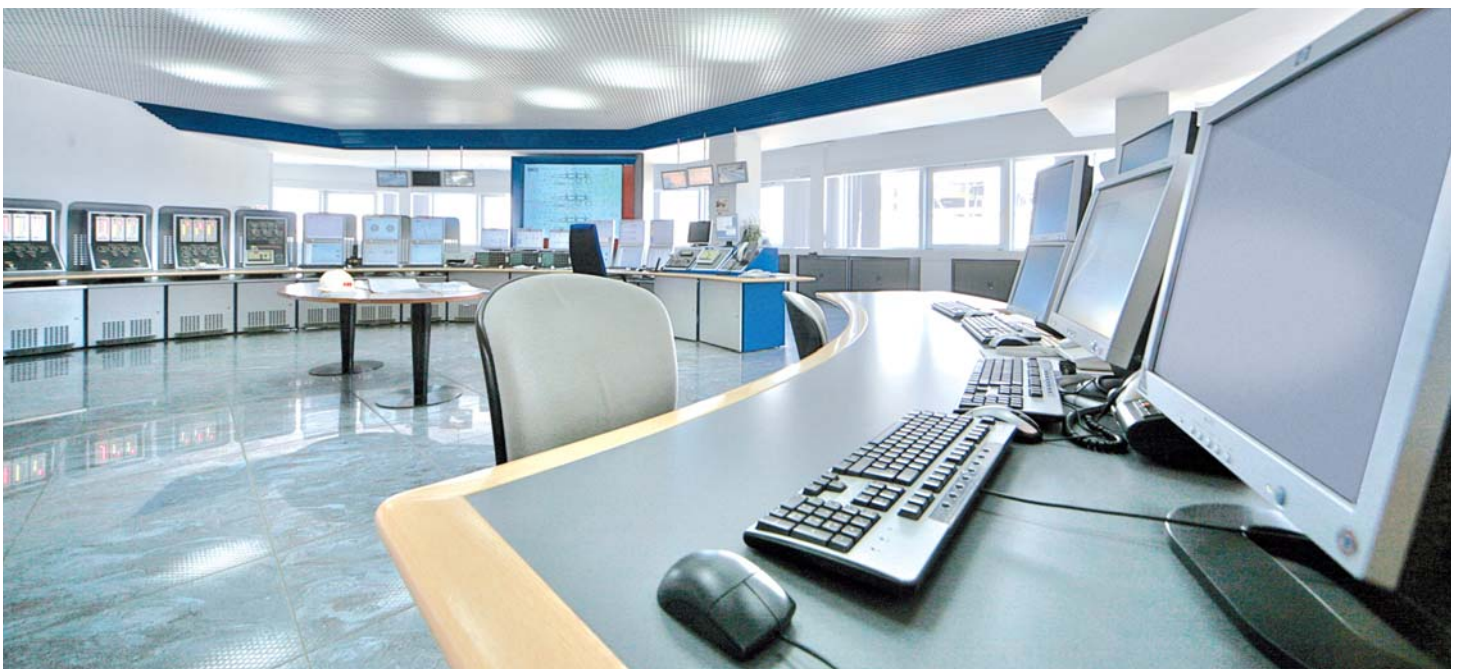
Condition monitoring

S+ Turbine includes MCM800 for condition monitoring, a module with four independently configurable channels and expanded connectivity via Modbus, PROFIBUS and OPC. ABB's Analyst™ is a graphical software application that provides specialized plots for assessing the condition of rotating machinery. Integrating powerful hardware with intelligent software to collect and analyze historical and waveform data for evaluation, allows the user to maintain continuous surveillance of critical assets and support proactive maintenance programs.

Mechanical/hydraulic capabilities

As an extension of S+ Turbine, ABB has developed a wide variety of hydraulic components to meet the varying needs of retrofitting mechanical-hydraulic controlled (MHC) and upgrading electrohydraulic controlled (EHC) systems, for all turbine manufacturers. These hydraulic components include final element actuators, pilot valve actuators, trip oil status manifolds, trip solenoid manifolds, accumulator stands and hydraulic power units.

In addition to these hydraulic components, ABB also provides design capabilities for complete EHC retrofits. Our services include custom component design and mounting, speed wheel and speed probe mounting, system demolition and installation engineering, as well as oil system piping.
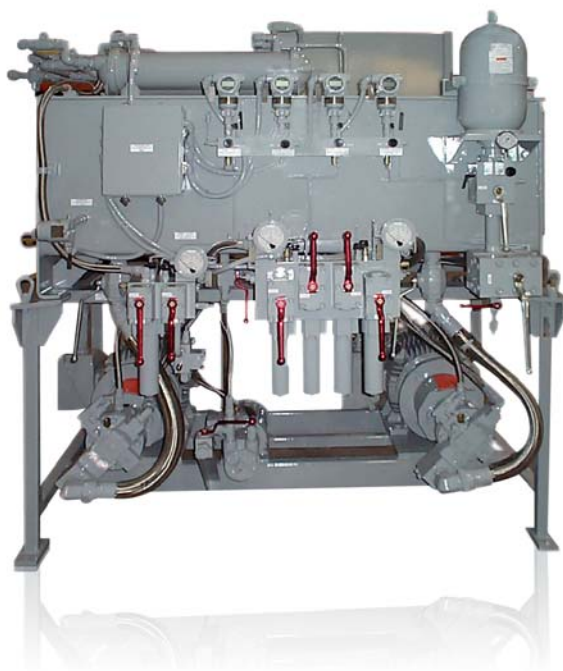
Installation services

The S+ Turbine offering is complemented by a diverse and comprehensive set of installation and startup service options. ABB has partnered with industry-recognized contractors and has working relationships with most major architectural engineering (AE) firms to provide effective on-site supervision and technical support of customer or third-party manpower resources, complete turnkey responsibility for installation and commissioning, as well as many other related on-site services such as system audits, vibration analysis, training and maintenance services.

S+ Turbine R&D

In addition to corporate level research and development (R&D), our business unit is committed to the development and optimization of products and solutions specific to the Symphony Plus turbine automation area, including:
– Dedicated intelligent modules for turbine protection, valve positioning, auto synchronization and condition monitoring
– Optimization of the overall turbine control solution ensuring fast response times and accurate control
– Rotor stress algorithms
– Turbine-specific control logic libraries
– Mechanical and hydraulic components for turbine control and protection

All these products and solutions are continuously enhanced and maintained by ABB in order to take advantage of the latest process control technologies and concepts.

Symphony Plus
S+ Turbine: Specialty Modules

S+ Turbine Specialty Modules (TP800, VP800, AS800 and MCM800) provide solutions for turbine protection, valve positioning, generator auto synchronization and condition monitoring. These are functions that standard DCS I/O modules cannot adequately address due to:
– Non-standard turbine-specific I/O interfaces (servo valves, speed pickups, generator potential transformer (PTs), etc)
– Strict response time requirements (need dedicated devices)
– High reliability requirements (need independence from the main controller)

These specialty modules make it possible to provide a fully integrated single-vendor solution for all aspects of turbine automation. Based on proven technology, the modules control steam turbines, gas turbines and hydro turbines in more than 15 different countries around the world. In addition, the modules have been tested and accepted by several major global turbine manufacturers and included in their standard offering.

The combination of S+ Control, TP800, VP800, AS800 and MCM800 results in a powerful turbine control system solution. The typical system would make use of three TP800s, one AS800, as many VP800s as modulating valves are in the turbine and as many MCM800s as are needed to accommodate all condition monitoring measurements.

Flexible installation configurations
– DIN rail mountable
– Standard 24 VDC power supplies
– Existing cabinet installation for retrofits
– Remote mounting eliminates wiring for new installations

PROFIBUS communication interface
S+ Turbine modules are fully integrated through a built-in, convenient and fast PROFIBUS DP interface. The main features of this interface are:
– DP/V1 communication standard
– Up to 12 MBd communication rate
– Conforms to PROFIBUS PNO slave specification
    System (master) redundancy
    Flying (line) redundancy
– 2 independent PROFIBUS slave hardware interfaces in each module

The PROFIBUS interface is used to exchange parameters, commands and process variables with the main controller, eliminating the need for local adjustment of jumpers or switches.

All four turbine specialty modules have embedded processors which execute their specific functions, and while they can exchange data with the main controller over PROFIBUS, they operate independently of it.

TP800, VP800 and AS800 components
S+ Turbine Specialty Modules comprise three basic components:
– Common Processor Module (CPM810), which is responsible for the execution of the software algorithms as well as for PROFIBUS communication
– Analog Module (either TPM810, VPM810 or ASM810), which is responsible for the conditioning and digitization of the field I/O signals
– Termination Base Unit (TBU810), which houses the CPM810 and the analog module, as well as the terminations for the field I/O and the PROFIBUS connections

It should be noted that the CPM810 and TBU810 components are common to all three products. It is the analog modules (TPM810, VPM810 and ASM810) that are unique, and which define the actual product functionality (protection, valve positioning or auto synchronization).

MCM800 components
The MCM800 is comprised of two unique components:
– The Termination Base Unit (TBU850) contains the terminals for power, field connections, and communication
– The Processor Module (MPM810) plugs into the TBU850, executes the selected functions of the MCM800 system and communicates to the control system via PROFIBUS DP or Modbus RTU
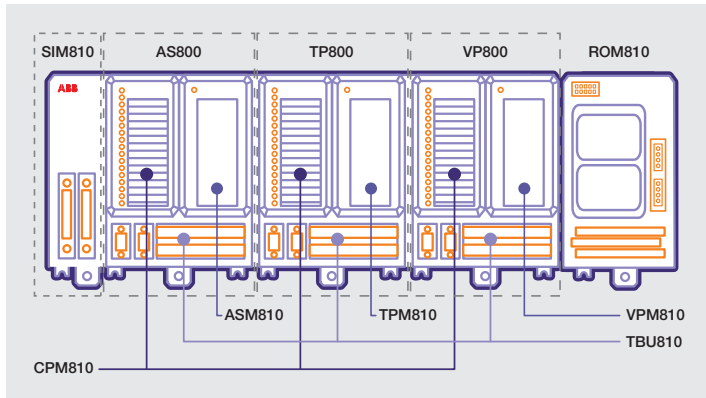
There are also a number of additional common modules which when added to the TP800, VP800 or AS800 products, expand their capability in the following ways:

Serial Interface Module (SIM810)

The Serial Interface Module (SIM810) is used to upgrade the firmware of all three turbine specialty modules. It can also be used for parameter configuration purposes when the modules are operating in standalone mode, without a PROFIBUS connection.

Relay Output Module (ROM810)

The Relay Output Module (ROM810) is a separate base unit with two electro-mechanical relays, compatible with all three turbine specialty modules through a direct plug-in connection. The ROM810 provides the TP800, VP800 and AS800 with heavy-duty relay output capability, ideal for driving inductive loads such as solenoids.

– 2 relays per ROM810
– 2 form 'C' contacts per relay
– Rated 5A @ 120 VAC
– Rated 3A @ 150 VDC
– Built-in inductive kickback suppression
– Relay coil activation feedback
– Power failure feedback
– Connectors for 2oo3 applications

Extended I/O Module (EIM810)

The Extended I/O Module (EIM810 for VP800 and AS800, EIM810t for TP800) provides additional pre-defined I/O capability to the turbine specialty modules. It is only necessary for applications with significant requirements for hardwired I/O signals, such as when interfacing to local panels with meters and switches. This product is also ideal for standalone applications.

Standalone capability

While all these modules have been developed to integrate tightly within Symphony Plus, they have also been provided with the ability to operate in standalone mode, without the presence of a master controller. This is sometimes convenient for auto synchronization and valve positioning, and sometimes required for turbine protection.

Turbine Automation Power Tools

When operating in standalone mode, the turbine specialty modules must be configured using a serial connection from a standard PC, via the SIM810 module. To facilitate this task, ABB has developed a PC-based application called Turbine Automation Power Tools, which can be used to configure and monitor the operation of the turbine specialty modules with ease and effectiveness.

Symphony Plus
S+ Turbine: Valve Positioner VP800

Valve Positioner VP800 adds turbine valve control capability to the Symphony Plus system or to any other control system with a PROFIBUS interface. It is intended for modulation of hydraulic actuators via servo valves or electro-hydraulic (I/H) converters. The typical application involves driving dual coil integrating servos with either single or redundant linear variable differential transformers (LVDTs). The VP800 performs closed loop control utilizing the position demand from the master controller and the position feedback from the LVDTs. The proportional and integral parameters establish the rate of movement and the settling characteristics of the control loop. The most common applications of the VP800 include the positioning of the inlet valves for steam turbines, gas turbines and hydro turbines.

Built-in PROFIBUS interface
– Non-proprietary communication for true open architecture integration
– Master and line redundancy

Automatic calibration
In order for the VP800 to position the valve properly, the voltage range of the position feedback device(s) must be calibrated. The calibration settings may be determined by using the built-in automatic calibration feature of the VP800, eliminating the need for any local adjustment of switches or jumpers. The entire calibration process is controlled through S+ Operations.

Automatic demodulation gain selection
The demodulation gain to apply to the signal(s) from the position feedback device(s) can be automatically calculated by the VP800 module, saving valuable time during initial module installation and startup.

I/H converter mode
Drives linear positioning devices (I/H converters) via direct linear mapping of the demand signal into a voltage output using an open loop control scheme.

Dual LVDT mode
Addresses applications with two cascaded, non-mechanically linked control elements (common in some servo-pilot valve arrangements for boiler feed pumps and hydro turbines). The cascaded PI control loop for this mode utilizes two feedback devices (for pilot and actual valve position) to form a closed loop control system.

Manual mode
Allows the operator to directly control the hydraulic actuator in the event of a master controller communication failure. In this mode, the operator can issue hardwired raise and lower commands to the VP800.

Integrated valve curve
Provides automatic implementation of the mapping function to translate flow demand into valve position demand to achieve linear changes in steam, gas or water flow.

Integrated valve testing

Provides automatic valve testing (on master controller request) to ensure proper operation of electronic and hydraulic components. Testing algorithms are flexible to account for different testing schemes for different turbine types and different manufacturers. Once the valve test is initiated, the VP800 moves the valve to a selected target position at a selected rate. If a fast dump solenoid is connected to the valve, it may be activated at a selected position.

Redundancy capability

Provides uninterrupted service in the event of a module or I/O connection failure. Two VP800 modules work together, sitting side by side, in order to achieve this functionality. One VP800 will actively control the valve while the other remains in standby mode, waiting to take over if the active VP800 fails. The two redundant VP800s are connected together and share information via the connectors of the TBU810.

The VP800 has internal relays that are used to make or break the connections to the field I/O terminals of the TBU810. When a VP800 is actively controlling the valve, the relays for all of the enabled I/Os will be closed. When a VP800 is operating in standby mode, the relays for all of the I/Os will be open. This feature allows the same field I/O to be connected to the field I/O terminals of both VP800s at the same time, adding yet another level of system availability.

I/O error detection

The VP800 monitors the servo driver output signals and the position feedback device signals to detect failures in these connections. The types of failures detected by the VP800 are as follows:
– A failed circuit on the VP800
– A failed transducer
– An input or output open condition
– An input or output short condition

Inputs

2 position feedback inputs
– AC LVDT, DC LVDT, AC LVRT, or 4-20mA device
– Single, redundant or dual
2 digital inputs (24/48 VDC)
– Open/close limit switch; or
– Emergency manual raise/lower

Outputs

Dual coil servo output
– Linear or integrating outputs
– 200mA maximum
4 relay outputs
– Fast dump solenoid
– Trip solenoid
– Manual mode indicator
– User defined

VP800 hardware

– 1 CPM810 Common Processor Module
– 1 VPM810 Valve Positioner Module
– 1 TBU810 Termination Base Unit
– x ROM810 Relay Output Module
– x EIM810 Extended I/O Module

The VP800 can interface to one or more relay output modules (ROM810), based on the requirements of each specific application.

In addition, the VP800 can also make use of the extended I/O module (EIM810) for addiitonal hardwired I/O capability.

Symphony Plus
S+ Turbine: Turbine Protection TP800

Turbine Protection TP800 adds turbine protection capability to the Symphony Plus system or to any other control system with a PROFIBUS interface. It provides a complete set of functions designed to address the protection requirements of most turbine types and manufacturers:
– Overspeed protection
– Overspeed trip
– Acceleration protection
– Trip anticipation
– Load drop anticipation
– Power load unbalance (three different types)

The TP800 allows for the implementation of all common protection schemes (1oo2, 2oo3, etc).

Built-in PROFIBUS interface
– Non-proprietary communication for true open architecture integration
– Master and line redundancy

Flexibility
Configurable parameters allow for proper matching of the TP800 features to the specific functional and physical characteristics of each application.

The configuration is performed through the PROFIBUS interface and includes:
– Field input configuration
– Protection function selection
– Protection setpoint adjustment
– Relay output programming
– Energize/De-energize output selection

Speed detection
Each TP800 module accepts two speed signals from either passive or active speed probes. The first channel is an input for the protection functions. The second channel is user configurable (protection or pass through). The speed channels have the following specifications:
– 0-120 VAC, 0-12,000 Hz frequency
– 50 mV PP threshold input level (adjustable)
– 0.1 Hz accuracy and 0.1 Hz precision (1.6 mHz generator frequency accuracy with a 60 tooth wheel)

The TP800 calculates two speeds for each speed input:
– High-precision full-cycle speed (used for reporting to master controller for closed loop speed control)
– Instantaneous internal speed (used locally inside the TP800 for execution of protection functions)

Fast response
Operational independence from the master controller results in high reliability and fast response time. Overspeed detection and trip are executed in under 8 msecs.
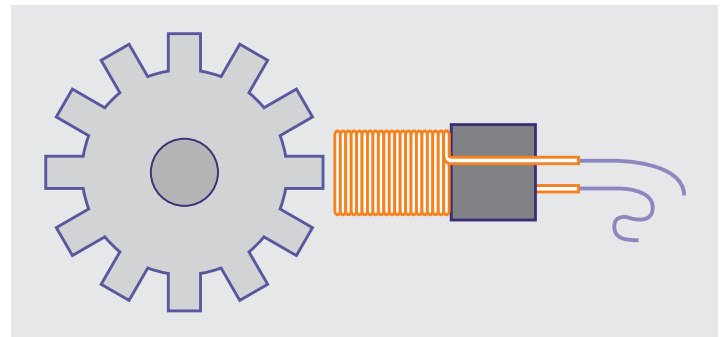
Automatic overspeed testing
The TP800 can automatically execute an online overspeed test through the internal injection of a ramping frequency signal into the speed channels. The test verifies proper operation of the software, hardware and hydraulic components of the trip circuit.
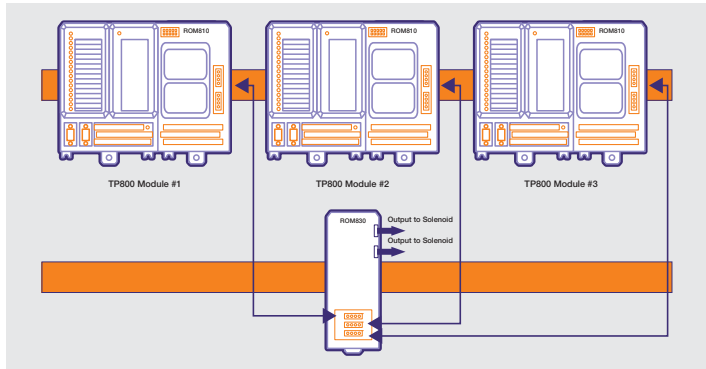
Flexible redundancy configurations

The TP800 module supports a variety of redundancy arrangements. The most common of these makes use of three TP800 modules in a 2oo3 configuration, with the voting performed either electronically or hydraulically.

– Hydraulic voting: characterized by three truly independent TP800 systems, each with its own set of ROM810 output modules, each driving a solenoid in a hydraulic manifold
– Electronic voting: the relay outputs of the ROM810 modules are used as inputs to the ROM830 (2oo3 voter module) where the 2oo3 voting is implemented electronically. This arrangement facilitates the interface to single elements (turbine master trip solenoids, inlet valves fast close solenoids, etc)

TÜV Rheinland SIL 3 certification

The overspeed trip functionality of the TP800 module is SIL 3 certified for functional safety when utilized in the following ways:

– 2oo3 redundancy arrangement
– Independent power supplies (one for each TP800)
– De-energized to trip configuration
– Periodic activation of the internal overspeed test

Advanced standalone mode

The TP800 has been developed with advanced standalone functionality, given that some standards (API 670) require this isolation for electronic primary overspeed protection systems (turbines without a mechanical bolt). The main features of the standalone mode are as follows:

– Configuration via serial connection from a PC running Turbine Automation Power Tools
– Internal overspeed test runs based on a timer
– Peer-to-peer communication between TP800s can be established using SIM810 modules, to coordinate the execution of the internal overspeed tests
– EIM810 modules can be added to the TP800 to increase hardwired I/O capability

Inputs

The required field inputs will vary from one application to another based on which protective functions are enabled. The input capability of the TP800 is as follows:

2 speed inputs
– Active or passive probes
– Cross compound applications
2 digital inputs (24/48/125 VDC and 120 VAC)
– Generator breaker
– Turbine reset
3 digital inputs (24/48 VDC)
– Miscellaneous trip functions
2 analog inputs (4-20mA or 1-5 V)
– Generator megawatts
– Intermediate steam pressure
1 AC input (0-5Amps)
– Generator phase current (with PCM810)

Outputs

The TP800 offers six independent relay driver outputs. A configurable matrix establishes the relationship between the protective functions and the relay drivers. In addition, each relay driver can drive one or more relays in the ROM810.

TP800 Hardware

– 1 CPM810 Common Processor Module
– 1 TPM810 Turbine Protection Module
– 1 TBU810 Termination Base Unit
– x ROM810 Relay Output Module
– x EIM810t Extended I/O Module (TP800 specific version)

The number of ROM810s will vary based on each application's requirements. The EIM810t is only needed if additional hardwired I/O is necessary (ie, standalone applications).

Symphony Plus
S+ Turbine: Auto Synchronizer AS800

Auto Synchronizer AS800 adds automatic circuit breaker closure capability to the Symphony Plus system or to any other control system with a PROFIBUS interface. It can be used for generator to grid synchronization as well as for peer-to-peer bus synchronization in switchyard applications.

The AS800 synchronizes two buses, A and B, by comparing voltage, frequency and phase difference between the buses. The module is configured by setting parameters in a main controller or via a PC interface when in standalone operation.

Before attempting to close the breaker, the AS800 will ensure that all signals are of good quality and within an acceptable range of specific setpoints. Additionally, an independent synch verification function is incorporated to help prevent a false breaker closure. The analog inputs typically come from potential transformers (PTs) that step down the voltage. The module reads the root mean square (RMS) voltage and frequency from the PTs. In addition, the module compares the phase difference between the two buses.

The AS800 module sends digital outputs to the ROM810 relay module to control the bus voltage and frequency by sending raise or lower pulses to the voltage regulator and the turbine speed governor respectively. These signals are also sent to the controller via PROFIBUS to allow for soft interfacing capability. Another digital output is used for the independent checking function. The final relay output initiates breaker closure.

Several digital inputs indicate breaker status, independent checking status, and optional hardwired permissives.

The AS800 features include:
– Line and generator mode
– Peer-to-peer mode
– Dead bus closure capability
– Voltage match control
– Frequency match control
– Independent checking

Line and generator mode
Line/generator synchronization relies on the assumption that the line is Bus A and the generator is Bus B. The AS800 will try to establish voltage and frequency matches by attempting to raise or lower the generator variables. In addition, breaker closure will be allowed only when the generation is running faster than the line, to avoid motorizing the generator.

Peer-to-peer mode
Peer-to-peer synchronization is similar to line/generator synchronization except that Bus A and Bus B are essentially equivalent buses (switchyard applications). As a result, either bus can have a higher frequency value (within the deadband limits). In addition, the AS800 will act as a passive device, looking for a voltage and frequency match to occur without attempting to raise or lower any variables.

Dead bus capability
The AS800 has the intelligence to recognize dead bus situations, and upon external enabling (dead bus enable input) will perform breaker closure.

Sync verification
The AS800 has a built-in independent synchronization circuit which serves as a check to the primary circuit. When voltage, frequency and phase match occur, the AS800 will only close the breaker when the primary and secondary synchronization circuits are in agreement.

Standalone mode
The AS800 can operate in harmony with a master controller via PROFIBUS communication or it can also operate independently with hardwired digital inputs and a serial communication from a standard PC. Ideally the PC would be running Turbine Automation Power Tools to facilitate the configuration of the AS800 module.

Built-in PROFIBUS interface
– Non-proprietary communication for true open architecture integration
– Master and line redundancy

Inputs
The AS800 field inputs include two AC voltage signals (buses to be synchronized) and eight digital inputs for process feedbacks and standalone mode interface.

2 AC inputs (120 VAC 50/60 Hz)
– Line/generator
– Bus A/Bus B (switchyard applications)

2 digital inputs (24/48/125 VDC, 120 VAC)
– Generator breaker
– Dead bus enable

6 digital inputs (24/48 VDC)
– Breaker status feedback
– Independent relay feedback
– 4 standalone mode permissives

Outputs
There are six outputs used to drive external relays (ROM810) for voltage regulator control, frequency control and generator breaker control. The two breaker control relays, main and Indicheck, can be connected in series.

AS800 hardware
– 1 CPM810 Common Processor Module
– 1 ASM810 Auto Synchronization Module
– 1 TBU810 Termination Base Unit
– x ROM810 Relay Output Module
– x EIM810 Extended I/O Module

The AS800 can interface to one or more relay output modules (ROM810), based on the requirements of each specific application.

In addition, the AS800 can also make use of the extended I/O module (EIM810) for additional hardwired I/O capability, particularly convenient in standalone applications.

Symphony Plus
S+ Turbine: Condition Monitoring

Symphony Plus offers a fully integrated condition monitoring solution comprising MCM800, an 'all-in-one' hardware module that can be easily programmed for all vibration and turbine supervisory functions, and Analyst, a user-driven graphical analysis software that creates specialized plots for use in assessing the condition of rotating machinery.

Functionality
The MCM800 provides a complete set of functions designed to address all the needs of rotating machinery, allowing for the implementation of all common monitoring and protection schemes.
– Vibration
– Eccentricity
– Thrust (rotor) position
– Differential (relative) expansion
– Case (absolute) expansion

Universal module
Cost effective – one module does it all:
- Provides online monitoring for critical equipment
- Provides continuous monitoring and protection
- Eliminates the need for separate communication hardware
- Simplifies the hardware learning curve
- Reduces hardware by combining functions
- Reduces spare parts inventory

The MCM800 protects assets and ensures the safety of personnel while optimizing plant operations and reducing life cycle costs.

Flexibility
The MCM800 interfaces with many different applications:
– Integrates into a DCS system or operates as a standalone system
– Allows installation in a centralized or remote location
– Configuration interface via PROFIBUS or Ethernet with provided tools

Scalability
The MCM800 design is based on an all-in-one architecture that can be configured for systems of any size. Modules can be added to existing systems at any time for only the incremental cost of the module.

The MCM800 can be set up as a complete custom-engineered system or purchased in a fixed, packaged configuration ready for installation as a standalone system. The standalone configuration is designed to be field mounted closer to the machinery to reduce field wiring requirements.

Complete high-level machine diagnostic capability
In addition to monitoring and protection functionality, the MCM800 offers condition assessment capability, allowing for the gathering of valuable data from the plant's rotating assets to ensure safety of personnel and assess overall machinery health and condition.

Information for condition assessment has two forms: waveform files and incremental static values such as amplitudes and position measurements. Waveform files are stored in a database on a data server, and static values are stored in a historian. Stored values are used for machinery assessment, along with other selected process variables. ABB's dedicated data server utilizes an embedded historian that can share information with a plant's independent data archival system. In addition, extensive machinery diagnostic tools are available for evaluation of static data and reduction of the waveform files.

Open, high-speed communication
Fast, standard and reliable, the MCM800 module includes redundant PROFIBUS and Ethernet interfaces using TCP/IP protocol and Modbus.

Graphical analysis capability

Analyst is the graphical analysis software application that provides specialized plots for assessing the condition of the monitored rotating machinery. The application uses various plot types to present the historical vibration data and selected unit parameters to the vibration expert, so that significant patterns and trends can be quickly recognized. This allows the expert user to identify problems or changes in the condition of rotating machinery assets so that they may be addressed before they adversely affect operations

MCM800 hardware products provide data for the following plots, available only by using Analyst:

Process variables	High-precision waveform data
X-Y plot	Time waveform
Bode plot	Direct orbit
Polar plot	Direct time waveform
Polar + trend plot	(Full) spectrum
Filtered orbit plot	(Full) cascade
Shaft centerline plot	

Why condition monitoring

Avoid costly, unplanned outages - know the condition of your equipment:
– Protect and manage high value assets
– Support predictive maintenance programs
– Maximize production and plant operations
– Reduce downtime

Types of rotating machinery and equipment
– Steam and gas turbine generators
– Feedwater pumps
– Fans and pumps
– Motors and gearboxes
– Compressors

Industries served
– Power generation
– Oil and gas
– Pulp and paper
– Metals and mining
– Water and wastewater

Why ABB's engineering excellence
– Total solution company with worldwide installations
– Technology innovation and a pioneering spirit
– Industry experts with an extensive knowledge base
– Reliable service and life cycle support

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