PRODUCT CATALOG

ABB ABILITY™ SYMPHONY® PLUS

ENGINEERED
TO OUTRUN



HR SERIES TURBINE CONTROL SOLUTIONS

FCS Mode
FCS mode is strictly a speed detection mode, where no protection functions are being applied locally by the SPTPS13 module. The speed channel channel is the only physical I/O channel that is used in this mode. Turbine speed is calculated by the TPS13 and passed through to the main controller (BRC4XX) via Expander Bus.

TSA Mode
The TSA mode provides turbine speed detection and calculation, overspeed protection and acceleration calculation. In addition, the TAS mode includes hardware based speed probe failure diagnostics designed to detect most speed probe open and short circuit conditions. Under the TSA mode of operation, the overspeed setpoint of the SPTPS13 can be automatically adjusted making use of a set of three digital inputs: Auto, Manual, and Test. In the code, the module calculates each of these setpoints, stores them in an array, and selects one for the overspeed setpoints based on the state of the Digital Inputs every cycle.

The TSA01 will detect an overspeed once the calculated turbine speed exceeds the current threshold value as determined by the state of the digital inputs. Upon detecting the overspeed condition, the SPTPS13's only action is to activate the digital outputs (no additional signals are sent through XBUS).

Technical data	
General	
System communications	8 bit parallel
Speed signal resolution	Accuracy 0 - 1000RPM 0.01 RPM 1000 - 12000RPM 0.001% of actual 12000 - 20000RPM 0.002% of actual
Mounting	One slot in standard Symphony Plus Modular Mounting Unit
I/O termination	Turbine Protection System Termination Unit (TPSTU02) NTDI01 for TSA01 and FCS01 modes
Operating	
Speed probe input	0.5–20 kHz, 0.05–120 VAC
Analog input	4–20 mA or 1–5 VDC (field inputs from termination unit)
Analog output	4–20 mA or 1–5 VDC (field outputs to termination unit)
Digital input	24 VDC (field inputs from termination unit) (24–125 VDC, or 24–120 VAC converted on TPSTU02 termination unit). 120 VAC/125 VDC for TSA01
Digital output	24 VDC (to termination unit) for TPS02, 120 VAC/125 VDC for TSA01
Electrical	
Operating voltage	+15 VDC ±5% at 320 mA +5 VDC ±5% at 100 mA 24 VDC ±10% at 75 mA
Power dissipation	4.8 W @ +15 VDC 0.5 W @ +5 VDC 1.8 W @ +24 VDC
Environmental	
Electromagnetic/radio frequency interference	Values not available at this time. Keep cabinet doors closed. Do not use communications equipment any closer than two meters from the cabinet.
Ambient temperature	0° to 70° C (32° to 158° F)
Humidity	5% to 90% RH (±5%) up to 55°C (non-condensing) 5% to 40% RH (±5%) up to 70°C (non-condensing)
Atmospheric pressure	Seal level to 3 km (1.86 miles)
Air quality	Non-corrosive
Installation category	Cateory II per ANSI/ISA-S82.01-1994

800 SERIES (DIN RAIL-BASED) TURBINE CONTROL SOLUTIONS

The S+ Turbine portfolio also includes the 800 Series Turbine Modules. These modules are well established in the turbine control market and are characterized by their universal and flexible nature. Their open communication capability (Profibus) allows for local or remote integration into many different DCS platforms. Their Stand Alone capability allows for operation without a DCS or through hardwired integration. S+ Turbine 800 Series comprises the AS800, VP800 and TP800 modules. Each module provides flexible mounting on a standard DIN rail and uses standard 24 VDC power supplies. They can be easily adapted to existing installations or new projects. The ability to remote-mount the modules and use PROFIBUS communications saves wiring costs and reduces design complexity for new installations.

Some of the key features of the PROFIBUS DP interface of S+ Turbine modules are:

- DP/V1 communication standard
- Up to 12 MD communication rate
- Conforms to PROFIBUS PNO slave specification system (master) redundancy and flying (line) redundancy
- 2 independent PROFIBUS slave hardware interfaces in each module

The building blocks of these turbine control solutions are:

CPM810
Executes the defined function of the module, interfaces with the ASM810 module and communicates to the control system via PROFIBUS DP

ASM810
Receives and conditions the field I/O signal, transfers the conditioned signal to the CPM810 module and provides an independent synchronization check

VPM810
Receives and conditions field I/O, converts input signals to digital output signals, and transfers the digital output signals to the CPM810 module

TPM810
Receives and conditions field I/O, converts signals to digital outputs, and transfers the digital signal to the CPM810 module

TBU810
Contains terminals for power, field connections, communication and connectors for modules

ROM810v2
Comprises a relay output module that provides digital output signals such as raise/lower volts, raise/lower frequency, close breaker and indicheck

ROM830
Voter module that can be used in combination with 3 ROM810v2 modules, turning the individual relay outputs into a single 2 out of 3 voted output.

PCM810
The Phase Current Module allows for the generator current signal from a current transformer to be brought into the TP800 module for power load unbalance calculations.

800 SERIES (DIN RAIL-BASED) TURBINE CONTROL SOLUTIONS



AS800

AS800

Auto Synchronizer AS800 provides automatic breaker closure during generator-to-grid synchronization or during peer-to-peer bus synchronization in switchyard applications. The AS800 compares and identifies the voltage, frequency and phase between two buses, typically a line and generator. It sends control signals to adjust voltage and turbine speed in order to synchronize the two buses. It is also capable of detecting a dead bus while initiating safe breaker closure.

The AS800 provides flexibility to operate efficiently in all turbine control environments. The module supports high and low voltage ranges (eg, 0-130 VAC and 0-50 VAC) ambient at either 50 or 60 Hz (40-70 Hz). The AS800 can either be operated in harmony with a PROFIBUS capable master controller like HCP800, or it can operate independently with hard-wired digital inputs and serial communication via a RS-232 physical interface.

Technical data	
General	
Microprocessors	MCF5272 with 16 MB Flash, 25 MHz, 16 MB DRAM
System communications	Profibus DP
Modular mounting	Each module occupies one slot in a Termination Base Unit (TBU810)
I/O termination	Termination Base Unit (TBU810)
TBU810 cabinet mounting	Standard 35mm DIN Rail
TU terminal blocks	24A/250V compression: 0.2-4 mm^2 [solid] / 0.2-2.5 mm^2 [stranded] / 24-12 AWG
Operating	
Low voltage (LV1-6)	Up to 48 volts
High voltage (HV1-2)	Up to 150 VAC/VDC
Digital inputs (DI 1-2)	Up to 150 VAC/VDC
Digital outputs (DO1-6)	Dry relay contact (2-Form C) 3A @ 150 VDC / 5A @ 120 VAC
Electrical	
Module operating	+24 VDC ±5% @ 264 mA typical
Module comsumption	6.4 W typical
Field I/O power via TBU810	+24 VDC (fused @ 1/4 amp)
ROM810v2 normal operating (No Field I/O)	+24 VDC ±5% @ 0.02 A typical de-energized (Both Coils) +24 VDC ±5% @ 0.17 A typical energized (Both Coils)
Performance	
Analog Inputs (Voltage)	1% of full scale
Analog inputs (frequency)	± 0.01 Hz
Phase difference	± 0.1 degrees
Environmental	
CE Mark	This product, when installed in a cabinet, was designed to comply with the following Directives/Standards for CE Marking.
EMC96 Directive (89/336/EEC)	EN50082-2 Generic Immunity Standard – Part 2: Industrial Environment
Low Voltage Directive (73/23/EEC)	EN61010-1 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 1: General Requirements
Certifications	
Canadian Standards Association (CSA)	This card was designed for use as process control equipment in an ordinary (non-hazardous) location
Humidity	5% to 90% RH (±5%) up to 55°C (non-condensing) 5% to 40% RH (±5%) up to 70°C (non-condensing)
Atmospheric pressure	Sea level to 3 km (1.86 miles)
Air quality	Non-corrosive
Installation category	Category II per ANSI/ISA-S82.01-1994
Dimensions	124 mm width, 186 mm height, 127 mm depth (4.88 in. width, 7.32 in. height, 5 in. depth)

800 SERIES (DIN RAIL-BASED) TURBINE CONTROL SOLUTIONS



VP800

VP800

Valve Positioner VP800 controls the flow of steam or gas through a turbine by precisely regulating the position of the inlet valves. The VP800 is part of a distributed modular I/O system. It provides easy installation and reliable performance using advanced control technologies. The VP800 provides easy installation of the modules and process cabling.

The VP800 and a Profibus DP Communication Interface are combined to communicate to a control system. A Common Processor Module (CPM810) and an Application Module (VPM810) plug into a Termination Base Unit (TBU810) to form the VP800. One or more Relay Output Modules (ROM810v2) may be connected to the basic VP800 to provide digital output signals. Additionally, two VP800's may be connected together to form a redundant configuration. In this configuration one VP800 will actively provide control of the valve while the other VP800 operates in Stand-By mode, waiting to take over if a problem occurs on the active VP800. The two VP800's may be connected to the same or to separate field I/O devices.

Technical data	
General	
Microprocessors	MCF5272 at 25 MHz, with 16 MB Flash, 16 MB DRAM DSP56F807 at 80 MHz, with 140 KB Flash, 12 KB RAM
System communications	Profibus DP
Module mounting	Each module occupies one slot in a Termination Base Unit (TBU810)
I/O termination	Termination Base Unit (TBU810)
TBU810 cabinet mounting	Standard 35mm DIN Rail
TU terminal blocks	24A/250V compression: 0.2-4 mm^2 [solid] / 0.2-2.5 mm^2 [stranded] / 24-12 AWG
Operating	
Low voltage (LV1-6)	Up to 12 V_{peak}
High voltagge (HV1-2)	Up to 12 VDC, 200 mA
Digital inputs (DI1-2)	24 VDC
Digital output (DO1-6)	Dry relay contact (2-Form C) 3A @ 150 VDC / 5A @ 120 VAC
Electrical	
Module operating (No field I/O)	+24 VDC ±5% @ 500 mA typical (One Coil) +24 VDC ±5% @ 700 mA maximum (Two Coils)
Module consumption	12 W typical (One Coil) 16.8 W maximum (Two Coils)
Field I/O power via TBU810	+24 VDC (fused @ 1/4 amp)
ROM810v2 operating (No field I/O)	+24 VDC ±5% @ 0.02 A typical de-energized (Both Coils) +24 VDC ±5% @ 0.17 A typical energized (Both Coils)
Performance	
Coil output precision	12 bits, 5.859 mV per bit, ±12 V full scale
Position input precision	12 bits, 0.806 mV per bit, 3.0 V full scale
Time from demand change to valve movement	1 ms typical 2.1 ms maximum
Profibus input update rate	1 ms
Profibus output update rate	50 ms
DSP communication rate	2 ms
DSP control process rate	0.1 ms
Manual mode movement rate	2.5 % / s
Time to feedback failure to initiate error action or failover	2 ms typical

800 SERIES (DIN RAIL-BASED) TURBINE CONTROL SOLUTIONS

Technical data (continued)	
Environmental	
CE Mark	This product, when installed in a cabinet, was designed to comply with the following Directives/Standards for CE Marking.
EMC96 Directive (89/336/EEC)	EN50082-2 Generic Immunity Standard – Part 2: Industrial Environment
Low Voltage Directive (73/23/EEC)	EN61010-1 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 1: General Requirements
Certifications	
Canadian Standards Association (CSA)	This card was designed for use as process control equipment in an ordinary (non-hazardous) location
Ambient temperature	0 to 55 °C (32 to 131 °F)
Humidity	5% to 90% RH (±5%) up to 55°C (non-condensing) 5% to 40% RH (±5%) up to 70°C (non-condensing)
Atmospheric pressure	Sea level to 3 km (1.86 miles)
Air quality	Non-corrosive
Installation category	Category II per ANSI/ISA-S82.01-1994
Dimensions	124 mm width, 186 mm height, 127 mm depth (4.88 in. width, 7.32 in. height, 5 in. depth)

800 SERIES (DIN RAIL-BASED) TURBINE CONTROL SOLUTIONS



TP800

TP800

The Turbine Protection TP800 provides a complete set of functions for comprehensive turbine protection and is safety certified by TUV Rheinland. These functions include:

- Overspeed Trip
- Overspeed Protection (including Acceleration Protection)
- Trip Anticipation
- Load Drop Anticipation
- Power Load Unbalance (3 different variations).

A Common Processor Module (CPM810) and an Application Module (TPM810) plug into a Termination Base Unit (TBU810) to form the TP800. One or more Relay Output Modules (ROM810v2) may be connected to the basic TP800 to provide digital output signals. An EIM810 may be connected to the TBU810 for additional inputs and outputs. In addition, a Phase Current Module (PCM810) may also be included with a TP800 system when interfacing to generator current transformers, sometimes used for power load unbalance calculations.

The SIM810 module is used to upgrade the firmware for the TP800. It is also used in the Stand Alone configuration. The ROM830 is used for 2oo3 voting with the ROM810v2. The TP800 modules have been IEC/EN 61508 SIL3 (Safety Integrity Level 3) certified for Functional Safety by TUV Rheinland. For specific details on the setup of a SIL3 compliant configuration please contact ABB, Inc. The TP800 modules have been CE Mark certified.

Technical data	
General	
Microprocessors	MCF5272 with 16 MB Flash, 25 MHz, 16 MB DRAM
System communications	Profibus DP
Modular mounting	Each module occupies one slot in a Termination Base Unit (TBU810)
Operating voltage	+24 VDC ±5% at 200 mA typical
I/O termination	Termination Base Unit (TBU810)
TBU810 cabinet mounting	Standard 35mm DIN Rail
TU terminal blocks	24A/250V compression: 0.2-4 mm^2 [solid] / 0.2-2.5 mm^2 [stranded] / 24-12 AWG
Operating	
Low voltage (LV1-6)	Up to 48 volts
High voltage (HV1-2)	Up to 150 VAC/VDC
Digital inputs (DI1-2)	Up to 220 VAC/VDC
Digital outputs (DO1-6)	Dry relay contact (2-Form C) 3A @ 150 VDC / 5A @ 120 VAC
Electrical	
Module normal operating (No Field I/O)	+24 VDC ±5% @ 0.21 A typical +24 VDC ±5% @ 0.3 A maximum
Module comsumption	5.0 W typical 7.2 W maximum
Field I/O	+24 VDC (fused @ 1/4 amp)
ROM810v2 normal operating (No Field I/O)	+24 VDC ±5% @ 0.02 A typical de-energized (Both Coils) +24 VDC ±5% @ 0.17 A typical energized (Both Coils)

800 SERIES (DIN RAIL-BASED) TURBINE CONTROL SOLUTIONS

Technical data (continued)	
Performance	
Speed input precision	Full cycle average (reported via Profibus) 0.1 Hz (0-4000 Hz) 0.25 Hz (4000-12000 Hz) Internal protection functions 0.25 Hz (0-12000 Hz)
Speed update rate	Full cycle average (reported via Profibus) 4 ms full cycle average Internal protection functions 4 ms
Analog input precision	0.26% full scale
Analog input update rate	20 ms
Digital input update rate	10 ms
Digital output update rate	4 ms
Profibus process variables in	20 ms
Overspeed trip	< 8 ms (measured at I/O terminals, from speed input to relay driver output)
Overspeed protection	< 12 ms (measured at I/O terminals, from speed input to relay driver output)
Trip anticipator protection	< 18 ms (measured at I/O terminals, from speed input to relay driver output)
Load drop anticipation	< 18 ms (measured at I/O terminals, from speed input to relay driver output)
Power load imbalance	TBD
Acceleration protection	TBD
Environmental	
TUV IEC/EN 61508 SIL3 (Safety Integrity Level 3)	This product complies with Functional Safety Standard under IEC/EN 61508 SIL3.
CE Mark	This product, when installed in a cabinet, was designed to comply with the following Directives/Standards for CE Marking.
EMC96 Directive (89/336/EEC)	EN50082-2 Generic Immunity Standard – Part 2: Industrial Environment
Low Voltage Directive (73/23/EEC)	EN61010-1 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 1: General Requirements
Certifications	
Canadian Standards Association (CSA)	This card was designed for use as process control equipment in an ordinary (non-hazardous) location
Ambient temperature	0° to 55° C (32° to 131° F)
Humidity	5% to 90% RH (±5%) up to 55°C (non-condensing) 5% to 40% RH (±5%) up to 70°C (non-condensing)
Atmospheric pressure	Sea level to 3 km (1.86 miles)
Air quality	Non-corrosive
Installation category	Category II per ANSI/ISA-S82.01-1994