**Product guide specification**

**Cyberex® PowerView Pro monitoring system**

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# General

## Summary and scope

The following technical specification describes the requirements of a circuit management system. This system is designed to provide metering data down to the main breaker, sub-feed breaker, and/or branch circuit breaker level.

## Standards

The Cyberex® PowerView Pro monitoring system (herein referred to as “PowerView”) shall be designed, tested (or certified) and manufactured to the following standards:

* Recognized Component by ETL to Underwriters Laboratories (UL) 60950-1 Information Technology Equipment – Safety
* Enclosure: NEMA 1
* Accuracy: ± 1% as per ANSI/NEMA C12.1 – 2015 (at 60Hz)
* Electromagnetic Compatibility (EMC): FCC compliant (part 15)

## Definitions

The following definitions shall apply throughout this specification:

* Owner, User or Buyer – the owner; or the owner’s designated representative(s).
* Manufacturer – the firm or corporation who will manufacture and deliver the RPP equipment specified herein.
* Specifications – the technical instructions described, or portions of standards referenced herein, and any addenda thereto.

## System description

### Environmental requirements

The PowerView shall be capable of withstanding any combination of the following environmental conditions without mechanical or electrical damage or degradation of operation:

* Operating ambient temperature: 0 to 40°C.
* Non-operating storage temperature: -40 to 60°C.
* Relative humidity: 10 to 95% non-condensing.
* Maximum operating altitude: 1828.8m (6000ft) above sea level.
* Equipment is designated for indoor use in a clean (dust-free), temperature and humidity-controlled environment.

## Warranty

The PowerView manufacturer shall guarantee the entire system against defective material and workmanship for a period of one (1) year from date of shipment.

With purchase of factory start-up services and used in the continental United States, the manufacturer shall include labor and expenses for a period of one (1) year from date of the factory start-up, not to exceed eighteen (18) months from date of factory shipment.

# Product

## Manufactured units

2.1.1 Circuit management system manufacturers: Subject to compliance with requirements, provide products by ABB (Cyberex®).

## Components

### Data acquisition module

The PowerView data acquisition module shall consist of three main components

#### Backplane Distribution Board (BDB)

Each PowerView monitoring system shall consist of a sheet metal enclosure surrounding a Backplane Distribution Board (BDB) with [6] [2] slots for accepting data acquisition cards. Cover plates shall be installed for any unused slots on the BDB.

#### Main Control Board (MCB)

The MCB is equipped with RJ-45 Modbus port to communicate with local display or customer BMS system. USB service port is used to configure the PowerView system.

#### Data acquisition cards

Data acquisition cards with various metering and monitoring functions are installed via connection to the BDB. The data acquisition cards are labelled according to their function and can be added for new capabilities. For a comprehensive list of available metering/monitoring features using the various data acquisition cards, refer to section 2.3.

### Power supply

PowerView will often have its own power supply, when installed in ABB Power Protection products. It is normally mounted below the sheet metal enclosure. Power supplies for PowerView shall meet the following requirements:

* 15 VDC output voltage
* 4A output current
* 0C to 40C operating temperature
* 3kV isolation voltage

### Current transformer (CT) sticks

The CT stick assemblies are designed to sense branch currents from panelboards. The power wire from each branch circuit breaker will pass through a CT (with 1 turn) on the CT stick assembly. A secondary sensing signal is brought to the data acquisition module via the wire harnesses.

The CT sticks designed to meet the breaker center to center dimensions for ABB ProLine, GE, and Square-D, 42-pole panelboards. As a result, different types of CT stick assemblies are needed for different panelboards for accepting 1-pole, 2-pole, and 3-pole circuit breakers rated up to 100 amps.

Each CT stick shall deploy field replaceable CT’s. Soldering of CT’s to a back plane shall not be allowed. CT wiring shall be screw terminal style to allow for easy field replacement. The CT’s shall use a plastic clip and mounting screw.

### Local display

*(Specifier’s Note: Refer to applicable Cyberex® product guide specification regarding whether a local display is included as a standard feature for product)*

The Cyberex® PDU or RPP shall be equipped with an industrial use, long life, color touchscreen, liquid crystal display (LCD) for the graphical user interface (GUI). The LCD shall measure at least 6.5 inches. The display shall contain all normal operating controls, metering and status indication via an integrated LED ring-light. Additionally, the GUI shall also be able to display an event log containing the condition/alarm, time, and date of the event.

The display panel shall become an integral part of the unit and shall indicate the following system information:

* Serial number
* Software version
* Modbus ID
* Board temperature
* Date of last upgrade
* Date of last service
* Date of initial installation

The monitoring panel shall employ an audible alarm to annunciate fault conditions that require acknowledgment and shall be silenced by acknowledging the condition on the display panel.

The local display shall also provide the following functionality:

* Ethernet gateway to enable the BCM to communicate using standard network protocols or Modbus TCP to read or configure the monitoring system
* Local high resolutions LCD display and local user interface to provide ability to read and configure the monitoring system
* Interconnection of up to 16 BCM systems in remote RPPs or PDMs to channel up to 2,688 individual branch circuits through the display’s Ethernet connection for access by the user’s network or BMS.
* Event logging of up to 5,000 time-stamped warning or alarm events. Time-stamping of events shall be synchronized via Network Time Protocol (NTP).

## Metering and monitoring features and options

The PowerView Pro shall offer the following metering and monitoring options:

*(Specifier’s Note: Metering and monitoring options below are optional adders. Select desired options to apply for distribution equipment.)*

### Cyberex® PowerView Pro Branch Circuit Management (BCM)

PowerView Pro BCM shall provide the capability of measuring individual currents (true RMS amperes) for up to 252 branch circuits residing in up to six, 42 circuit panel boards.

PowerView Pro BCM (current) shall provide the following:

* True RMS current, peak current (resettable), minimum current (resettable) for each branch circuit
* Panel board phase current
* Voltage, power, energy, power factor and THD (current) up to the 35th harmonic for each branch circuit
* Voltage, power, energy, power factor and THD (current) up to the 35th harmonic at the panel board level
* User configurable warning and alarm thresholds for each circuit
* User configurable warning and alarm statuses for each circuit
* PC-based set up software capable of global or individual circuit setup
* Modbus RTU over RS485 to connect to users building management system (BMS)
* Individually replaceable 60A solid core CTs bracket-mounted on each side of each panel shall be standard
* Individual 100A solid core CTs shall be available as factory or field-installed options.

### Cyberex® PowerView Pro Sub-Feed Circuit Management (SFCM)

PowerView Pro SFCM shall provide the capability of providing phase current, metering at the sub-feed circuit level for up to 67 sub-feed breakers with the following functionality:

* True RMS current, peak current (resettable), minimum current (resettable) for each sub-feed circuit
* Voltage, power, energy, power factor and THD (current) up to the 35th harmonic
* User configurable warning and alarm thresholds for each sub-feed circuit
* User configurable warning and alarm statuses for each sub-feed circuit
* PC-based set up software capable of global or individual circuit setup
* Modbus RTU over RS485 to connect to users building management system (BMS)

### Cyberex® PowerView Pro Main-Feed Circuit Management (MFCM)

PowerView Pro MFCM shall provide the capability of providing phase current, metering at the panel board main or source level with the following functionality:

* True RMS current, peak current (resettable), minimum current (resettable) for each main feed circuit
* Voltage, power, energy, power factor and THD (current) up to the 35th harmonic for panel board main or source
* User configurable warning and alarm thresholds for each main feed circuit
* User configurable warning and alarm statuses for each main feed circuit
* PC-based set up software capable of global or individual circuit setup
* Modbus RTU over RS485 to connect to users building management system (BMS)

### Cyberex® PowerView Pro thermal monitoring

* The monitoring system shall be equipped with a Thermocouple Input Board (TIB) to accept inputs from thermocouples installed in the unit.
* PowerView Pro thermal monitoring shall provide actual temperature data from individual thermal sensors and allow for customization of name, state (*ex. on, off*), warning and/or alarm limits, and delays for each thermal sensor.

### Cyberex® PowerView Pro breaker status monitoring

* The monitoring system shall be equipped with a Discrete Input Board (DIB) to accept aux contacts for monitoring input status of components such as breakers or doors.
* When used for breaker status monitoring, the system shall monitor and report [open and closed] [open, closed, and tripped] statuses for each specified breaker.

## Additional features and functions

The PowerView Pro shall be equipped with the following standard features and functions:

### Waveform capture

* The PowerView Pro monitoring system shall have the ability to capture waveform samples at the following points:
	+ primary and secondary of PDU transformer
	+ main-feed circuit breaker(s)
	+ sub-feed circuit breaker(s)
	+ individual branch circuits
* Waveform samples shall be viewable via the PDU or RPP local display and able to be extracted via externally accessible USB port.

### Custom naming/numbering

* The user shall have the ability to customize the naming or numbering of individual circuits or panelboards.

### Custom grouping

* The user shall have the ability to create up to 50 custom groups of sub-feeds, panels, or branch breakers.
* The following parameters are aggregated and reported at the custom group level:
	+ kW
	+ kWh
* The system shall trigger a warning or alarm if any individual circuit within a custom defined group exceeds its respective warning or alarm thresholds.

### PDU input breaker shunt trip

* The PowerView Pro shall have the ability to shunt trip the PDU main input circuit breaker under the following conditions:
	+ input over and/or under-voltage
	+ transformer over temperature
	+ output ground over-current
* The user shall also have the ability to configure the PDU main input circuit breaker to shunt trip under the following conditions:
	+ output over-current
	+ output over and/or under-voltage
	+ output over kW
	+ output over kVA

## Communications

The PowerView shall support the following communication options:

* RS485 port with Modbus RTU protocol: 2-wire or 4-wire connection, up to 38400 baud
* Modbus TCP/IP, ability to be pinged by up to 5 building monitoring systems BMS
* USB for data downloads and service access

# Execution

## Overview

Factory start-up and user training, preventive maintenance service, and full service for the above specified system shall be included upon request. The manufacturer shall nationally employ service organizations of factory-trained field service personnel dedicated to the start-up, maintenance, and repair of the manufacturer’s power equipment.

The manufacturer shall maintain (24 hours per day, 365 days per year) an answering service to facilitate in providing technical support and emergency service dispatching.

### Installation, inspection and factory authorized start-up

Installation and start up shall include the following:

* Ensure removal of temporary shipping bracing.
* Verify all electrical connections for tightness as specified.
* Review the field assembly and connection of components.
* Inspect accessible components for cleanliness, for mechanical and electrical integrity, and for evidence of damage or deterioration.
* Pretest and adjust all monitoring and/or control parameters as required.
* Correct all deficiencies before proceeding with tests. Correct deficiencies identified by tests and retests.
* Record circuit monitors set-ups, if applicable.
* Measure output voltage of branch circuit panel board, if applicable. Verify proper operation of equipment, including circuit monitor and input and output control circuits.
* Submit test reports.

### Training (optional)

Concurrent with factory authorized system startup the manufacturer’s field service engineer shall train the owner’s operating personnel in the proper operation of the system. Training shall last a minimum of two hours and shall include:

* Safety precautions
* Features and construction of project equipment
* Voltage adjustment procedures, if applicable
* Routine inspection and test procedures
* Routine cleaning
* Interpretation of reading of warnings and alarms

**End of specification**