Bitronics® M871

The Bitronics M871 IED provides a complete solution for monitoring and recording in substation applications. The advanced measuring, recording, and communications characteristics and utility-grade construction make it suitable for applications in AC distribution and transmission systems.

Applications

The M871, through its multi-mode recording and its ability to make high speed, high accuracy measurements, provides the information necessary to analyze:

- Network faults
- Reactions of the protective devices
- Dynamic response of the network
- Long-term trends
- Revenue readings at interties
- Substation equipment performance

The M871 provides a low-cost entry into disturbance recording through a distributed approach. The M871 can be installed locally on a per-feeder basis. It can also be interconnected via peer-to-peer GOOSE messaging that allows cross-triggering to occur without the need for hard-wiring of the contacts. It thus provides a scalable approach to station-level recording.

The M871 complements relays by providing independent, higher-fidelity waveform capture. It has two waveform recorders and also provides two disturbance recording modes and trend recording not typically found even in the most advanced digital relays. It also provides features such as fault location and SCADA communications that can automate a substation where electro-mechanical relays are used. The split-core CT option simplifies installation without the need for an outage.

The M871 fully complies with the requirements under NERC PRC-002-2 for Disturbance Monitoring Equipment (DME). It satisfies all three recording requirements of the DME, Sequence of Event Recording (SER), Dynamic Disturbance Recording (DDR) and Fault Recording (FR).

The M871 can replace conventional measuring instruments (measurement centers), as well as trend, sequence-of-event, disturbance, and station fault recorders.

The ability to support multiple physical links and protocols simultaneously allows easy integration in retrofit applications or newer substation automation projects. The M871 serves as a front-end to SCADA while also providing system-wide access to important substation data.

Bitronics M871

Functional Summary

- Over 2000 high accuracy measurements
- Distance to fault measurements
- Supports multiple protocols simultaneously
- One set of 3-phase with neutral current inputs
- Two sets of 3-phase voltage inputs
- Battery voltage inputs
- Wide-range universal auxiliary power supply
- Two waveform recorders
- Two disturbance recorders
- Sequence of Events Recorder
- Nonvolatile memory for recording (up to 2GB)
- Optional digital inputs and digital outputs
- Optional transducer inputs
- One RS-232 and three configurable RS-232/RS-485 ports
- Optional Ethernet, copper or copper and fiber optic
- Optional Modbus Plus port
- Other optional accessories are: D650 detached displays, Analog Output Converters and Modulated IRIG-B adapter
- Three modular chassis sizes

Feature Summary

- One model for 2, 2½ or 3-Element systems with selectable CT and PT ratios
- ¼ to 1-cycle measurement update rate
- Wide input frequency range of 15-70 Hz
- Voltage and current accuracy better than 0.1% of reading
- 0.2% revenue-class energy measurement with S11 or S12 signal input module
- Assignable Modbus registers and DNP3 analog points
- Simultaneous recording for all recorders
- Event triggering with logic includes hysteresis from any analog threshold value, rate-of-change of analog value, digital input, or "virtual" input (GOOSE message)
- IEC 61850 Compliant
- Automatic event notification

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Specifications

Measurement and Signal Inputs

- Measurements including volts, currents, power, energy, frequency, demand, individual and total harmonics, K-factor, current & voltage unbalance, flicker, impedance and symmetrical components
- Current input for the S10 Signal Input module has a nominal range of 0 - 5A ac, linear to 100A ac symmetrical rms at all rated temperatures.
- Current input for the S11 Signal Input has a range 0 - 1A ac or 0 - 5A ac, linear to 20A ac symmetrical rms at all rated temperatures and the 0 – 5A ac range is compliant to IEC 60687 and ANSI C12-30-1998 revenue class accuracy of 0.2%
- Current input for the S12 Signal Input has a nominal range of 0 - 1A ac, linear to 4A ac at all rated temperatures and is compliant to IEC60687 and ANSI C12-30-1998 revenue class accuracy of 0.2%
- Current input for the S1C split-core external CT option has a nominal range of 0-5A ac, linear to 100A ac symmetrical rms at all rated temperatures and is compliant to IEC60687 and ANSI C12-30-1998 revenue class accuracy of 0.2%
- The AC voltage inputs are intended for use on nominal system voltages up to 480V ac rms phase-phase (277V ac RMS phase-neutral)
- Two auxiliary AC/DC voltage inputs are intended for use on nominal system voltages up to 480V ac rms phase-phase (277V ac RMS phase-neutral), and on DC system voltages up to 250V dc
- Transducer input option that provides eight inputs in 0-1mA, 4-20mA or 0-10V ranges

Recording

- Waveform recorders have up to 14 assignable analog channels with adjustable sampling rates of 32 or 64 and 128 samples per cycle. The sampling rate can increase to 256 samples per cycle if only 7 channels are connected. Pre-trigger and post trigger size is assignable. Digital inputs can be included in the recording. Stored in COMTRADE format.
- The Disturbance recorders have up to 64 assignable measurement channels with a selectable time resolution from one cycle to sixty seconds. Pre-trigger and post trigger size is assignable. Stored in COMTRADE format.
- The trend recorders have up to 230 selectable parameters with time resolution of one minute to twelve hours. Choice of instantaneous or min, max and average.
- Sequence of Event recording has 5,000 event record storage with events time stamped to 1 microsecond. Stored in Text format.
- All triggers have three trigger modes

Communications

- One RS-232 and three configurable RS-232/RS-485 ports supporting baud rates from 9600 to 38400
- Optional 10BaseT/100BaseTX or added 100Mb fiber-optic port (100BaseFX)
- Supports protocols: DNP3 Level 2, DNP3 TCP/IP, DNP3/UDP, Modbus RTU, Modbus TCP/IP, ZMODEM, FTP, telnet, IRIG-B, SNTP and IEC 61850
- An IRIG-B port adapter with BNC connector is available that accepts modulated signals and interfaces directly to one of the serial ports.
- Automatic event notification via Ethernet or serial media

Modular Design

The M871 uses a modular design based on the Compact PCI® bus. There are three chassis sizes:

- Short Chassis, with 3 optional module slots at 8.5" wide.
- Intermediate Chassis with 5 optional module slots at 11.65" wide.
- Long Chassis with 6 optional module slots at 13.45" wide.

An M871 must have the following modules:

- V10 universal power supply module, rated 20-300V dc/55-275V ac.
- H12 host processor and A10 analog processor module consisting of a 486 Processor, 32-bit DSP, 16-bit A/D converter and RAM and nonvolatile memory
- One signal input module. There are choices of an S10, S11, S12, or S1C signal input module.

The choices of optional modules and their max quantity depend on the chassis size and what module space is available.

- E1 or E3 Ethernet Option (1 Max)
- P30A Digital I/O Module 8 DI/ 4 DO (6 Max)
- P31 Digital I/O Module 16 DI/ 4 DO (3 Max)
- P33 Digital Output Module 8 DO (6 Max)
- P40 Transducer Input Module 8 AI (2 Max)

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