Guideform Specification – Digital Fault/Disturbance Recorder with PMU and Traveling wave fault location

GE Reason RPV311 Multifunction Digital Recorder

GE Reason RA331, RA332, RA333 Acquisition units

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Functional Specifications

The fault recording system shall, when triggered, record in analogue form, three phase currents, residual current, three phase voltages and in digital form, event information, including: first and second main protection equipment outputs, associated intertripping and signalling equipment outputs and switchgear operation before, during and after system fault incidents.

- Channel capacity:

  Up to 64 analog inputs (voltage, current, DC transducers);

  Up to 12 high-speed analog inputs for Traveling Wave Fault Location;

  Up to 256 opto-isolated digital inputs;

  Up to 8 fiber-optic links to connect to RA331, RA332 or RA333 remote acquisition modules;

- Acquisition system:

  16-bit opto-isolated analog-to-digital converters, independent for each channel (50/60 Hz channels);

  256 points-per-cycle sampling rate (50/60 Hz channels);

  Frequency response of DC to 3.0 kHz;

- Up to 320 binary inputs in 61850-8-1 GOOSE messages;
- Capable of reading and recording up to 8 streams of Sampled Values IEC 61850-9-2LE simultaneously with up to 64 analog conventional channels;
- Capable of monitoring and recording DC measurement from IEC 61850-9-2LE Sampled Values
- 60 GB SSD (solid-state drive) capacity. 33,5 GB reserved for recordings;
- Trigger waveform recorder at 256, 128, or 64 samples/cycle;
- Continuous waveform recorder at 16 samples/cycle;
- Continuous disturbance recorder and triggered disturbance recorder at 1 sample/cycle;
- IRIGB-004 and SNTP/NTP (version 2, 3 or 4) time synchronization;
- Automatic Traveling Wave Fault Location functionality with voltage from VT;
- MODBUS and DNP3 interface for SCADA integration;
- Synchrophasor measurement and transmission as per IEEE C37.118.1a-2014 and IEEE C37.118.2-2011;

- Capable of transmitting synchrophasors (IEEE C37.118.1a-2014 and IEEE C37.118.2-2011) from Sampled Values IEC 61850-9-2LE and conventional analog channels measurements simultaneously;
- Historical average at aggregation intervals of 1 or 10 minutes;
- Measurement and recording of harmonics up to the 50th order as per IEC 61000-4-7;
- Measurement and recording of flicker as per IEC 61000-4-15;
- Cross-trigger using standard network connection;
- One-end fault location based on Takagi algorithm;

Mechanical Specifications

Design

- The device shall have a modular design i.e. where the entire DFR scheme has one common set of processing and control cards/units and where analog and binary data input cards/units (acquisition units) can be added as separate modules to expand the number of analog and binary inputs that can be monitored.
- The processing unit shall be presented in a 3U case height format (133,55 mm), and the acquisition units shall be presented in a 5U case height format (222,0 mm).
- The processing unit shall be housed in a 19'' case width (482,6 mm), and the acquisition units shall be housed in a ½ 19'' (222,0 mm).
- The solution design shall be fan-less and have no rotating parts.

Enclosure Protection

The degree of protection offered shall be as per IEC 60529: 2002:

Processing Unit:

- IP 40 Protection for the front panel;
- IP 20 Protection for the sides and rear of the case;
- The device shall be housed in a metallic case wrapper;

Acquisition Unit:

- IP 54 Protection for the front panel;
- IP 20 Protection for the sides and rear of the case;
- IP 10 Protection for the sides of the case;
- The device shall be housed in a metallic case wrapper;

Weight

The weight of the processing unit shall be < 4 kg, and the weight of the acquisition units shall be < 3 kg.

General Input/Output Terminals

CT terminals shall be ring-lug screw type for security and robustness:

Communication and alarming:

- Two 10/100BaseT electrical Ethernet interfaces for communication, configuration, download and GOOSE reading;
- Two embedded electrical-to-optical Ethernet converters with ST connectors;
- RS232 serial port for modem connection;
- One RJ45 Ethernet internface for Process Bus (IEC 61850-9-2LE Sampled Values) connection.
- Local HMI interface on the front panel for monitoring;
- 4 dry-contact relays for remote signaling of alarms;
- Fax and e-mail message after detection of a trigger. The fax can be sent to two different destinations and the e-mail to four different destinations.

Power Supply Specification

- Nominal range: 100-250 V dc, 110-240 V ac
- Maximum voltage range: 80-300 V dc, 88-264 V ac
- Frequency: 50 / 60 Hz, ± 3 Hz

  Or

- Nominal range: 24/48 Vdc
- Maximum voltage range: 18 – 75 Vdc

Environmental Conditions

Ambient Temperature Range

Operating temperature range: -40°C to +55°C (or -40°F to +131°F)

Tested as per IEC 60068-2-1: -40°C operation (16 hours)

Tested as per IEC 60068-2-2: +85°C operation (16 hours)

Relative Humidity

From to 5 to 95%, non-condensing.

Standards Compliance / Type Tests

EMC Compliance

As minimum, the equipment shall use the IEC 60255-26 standard to establish EMC conformity.

Product Safety

As minimum, the equipment shall use the IEC 61010-1 standard to ensure product safety.

The device shall meet the IEC 60255-5, ensuring insulation resistance greater than 100MΩ when applying 500 Vdc.

Mechanical Robustness

The device shall comply with vibration, shock and seismic tests as described in IEC 60255-21 standard.

Vibration Test
As per IEC 60255-21-1 Class 2

Shock
As per IEC 60255-21-2 Class 1

Seismic Test
As per IEC 60255-21-3 Class 2

EU Directives

A declaration of conformity shall evidence compliance with EU directives, and the device shall display a CE mark.