



RPV311

Digital Fault Recorder With Fault Location and PMU

The solution is composed of the RPV processing unit and remote acquisition units RA331, RA332 and/or RA333. It acquires monitors and records electrical quantities in applications where high performance, modularity, flexibility and high channels counts are demanded. The RPV311 is the most complete solution on the market for digital substation applications, thanks to its powerful suite of integrated functions, coupled with the scalability of the hardware.

Customer Benefits

- Fault recorder
- Disturbance recorder
- Continuous recorder (waveform and RMS)
- Phasor Measurement Unit (PMU) in accordance with IEEE C37.118.1/2-2011/1a-2014
- Steady-state recorder
- Flicker and Harmonics
- Sequence Of events recorder
- Travelling wave-based fault locator (TWFL)
- Process bus (IEC61850-9-2LE recorder)
- DC to 3 kHz measurement
- IEC61850-8-1 support
- WMU (Waveform Measurement Unit)
- Up to 64 analog, 256 binary and 320 GOOSE inputs

Technical Specifications

ENVIRONMENTAL CONDITIONS

Equipment	RPV311	RA33x
Operating temperature range	- 40... +50 °C (or -13°F to +122°F)	-40 ... +55 °C
Maximum operating altitude	2000 m (6560 ft)	2000 m (6560 ft)
Relative humidity	5 ... 95 %, noncondensing	5 ... 95 % noncondensing
As tested per 60068-2-2	-40°C	-40°C
Power consumption RA333	+55°C	+85°C

OPTICAL ETHERNET PORT

Interface	10BASE-T / 100BASE-TX
Bit Rate	10 / 100 Mbps
Connector	ST
Fiber Type	Multimode 62.5 / 125 µm
Emission Power	- 20 dBm
Receiver sensitivity	- 32 dBm
Maximum Applicable Power	- 14 dBm

MODEM SERIAL PORT

Signal level	RS232
Bitrate	1200, 2400, 4800, 9600, 19200, 38400 bps
Databits	7 or 8
Stopbits	1 or 2
Parity	None, even, odd
Connector	DB9 (female), standard DTE
Isolation Level	1.44 KVdc

ELECTRICAL ETHERNET PORT

Name	Eth 1 and 2	Eth 3
Use	Configuration, monitoring and GOOSE	IEC 61850-9-2LE Sampled Values and GOOSE
Interface	10BASE-T 100BASE-TX	10BASE-T 100BASE-TX
Bit Rate	10 / 100 Mbps	100 Mbps
Connector	RJ 45	RJ 45
Isolation Level	1.44 KVdc	1.44 KVdc

OPTICAL IRIG-INPUT

Signal	IRIG-B004
Wavelength	820 nm
Fiber type	Multimode 62.5 / 125 µm
Connector	ST
Sensitivity	- 24 dBm

TW ANALOG ACQUISITION RA333

Resolution	8 bits
Sampling frequency	5 MHz
Time skew	0 µs



POWER SUPPLY

Nominal voltage range	100-250 V dc 110-240 V ac	24/48 Vdc
Maximum voltage range	80-300 V dc 88-264 V ac	18 - 75 Vdc
Frequency	50 / 60 Hz ± 3 Hz	50 / 60 Hz ± 3 Hz
Power consumption RPV311	MAX 60 VA Typically 50W	MAX 50W
Power consumption RA331, RA332	MAX 20 VA	MAX 30W
Power consumption RA333	MAX 30 VA	MAX 30W
Isolation Level	3.3 KVdc	3.3 KVdc

DRY-CONTACT RELAY OUTPUTS

Max Voltage	250 Vdc
Max Current	1A
Load	Resistive
Contact Numbers	1 normally closed 3 normally open
Isolation Level	3.3 KVdc

FIBER-OPTIC LINKS

Wavelength	1300 nm
Fiber Type	Multimode 62.5 / 125 µm
Connector	ST
Emission Power	- 20 dBm
Receiver sensitivity	- 32 dBm
Maximum Applicable Power	- 14 dBm

TYPE TESTS RPV311

IEC 61000-4-2:2008	8kV contact / 15KV air (level 4)
IEC 61000-4-3:2006	10 V/m
IEC 61000-4-4:2012	2 KV @ 5KHz (level 3)
IEC 61000-4-5:2005	Differential mode: 2KV Common mode: 1KV (level 3)
IEC 61000-4-6:2008	10V
IEC 61000-4-8:2009	30A/m continuous 300A/m @ 1s.
IEC 61000-4-11:2004 IEC 61000-4-29:2000	- A.C. and d.c. voltage dips Test level: 0% residual voltage Duration time a.c.: 1 cycle d.c.: 16,6ms - Test level: 40% residual voltage Duration time a.c.: 12 cycles d.c.: 200ms - Test level: 70% residual voltage Duration time a.c.: 30 cycles d.c.: 500 ms - A.C. and d.c. voltage interruptions Test level: 0% residual voltage Duration time a.c.: 300 cycles d.c.: 5s
IEC 61000-4-17:1999	Test level: 15 % of rated d.c. value Test frequency: 120Hz, sinusoidal waveform
IEC 61000-4-18:2006	Voltage oscillation frequency: 1MHz Differential mode: 1kV peak voltage; Common mode 2,5kV peak voltage
Gradual Startup	Shut-down ramp: 60s Power off: 5m Start-up ramp: 60s
CISPR11:2009	Radiated emission Limits: 30 to 230MHz - 50dB(µV/m) quasi peak at 3m 230 to 1000MHz - 57dB(µV/m) quasi peak at 3m
CISPR22:2008	Radiated emission Limits RPV311: The test frequency is defined based on the maximum internal frequency of equipment. 1 to 3GHz - 56dB(µV/m) average; 76dB(µV/m) peak at 3m 3 to 6GHz - 60dB(µV/m) average; 80dB(µV/m) peak at 3m On RA33x, the maximum internal frequency is 100 MHz. For this case, the levels of CISPR 11 satisfy the normative IEC 60255-26. Conducted emission Limits: 0.15 to 0.50MHz - 79dB(µV) quasi peak; 66dB(µV) average 0.5 to 30MHz - 73dB(µV) quasi peak; 60dB(µV) average

ENCLOSURE PROTECTION IEC 60529

Equipment	RPV311	RA33x
Front flush mounted with panel	IP54	IP54
Rear and sides	IP20	IP10

SAFETY TESTS

Safety	IEC 61010-1
IEC 60255-5	Inpulse - 5KV Dielectric withstand - 3,3KVDC for 60 seconds Insulation > 100M Ω

ENVIRONMENTAL TESTS

Equipment	RPV311	RA33x
IEC 60068-2-1	-40°C, 16 hours (Cold)	-40°C, 16 hours (Cold)
IEC 60068-2-2	+55°C, 16 hours (Dry heat)	+85°C, 16 hours (Dry heat)
IEC 60068-2-30	95% no condensation, 55°C (Damp heat)	95% no condensation, 55°C (Damp heat)
IEC 60068-2-14	-40°C to 55°C / 9 hours / 2 cycles (Change of temperature)	-40°C to 85°C / 9 hours / 2 cycles (Change of temperature)
IEC 60255-21-1	Class 2 (Vibration)	Class 2 (Vibration)
IEC 60255-21-2	Class 1 (Shock)	Class 1 (Shock)

DIMENSIONS

Equipment	RPV311	RA33x
Height (front panel)	133.55 mm (3 U)	222 mm (5 U)
Height (rear)	86 mm	200 mm
Width (front panel)	482.6 mm (19")	222 mm (1/2 19")
Width (rear)	427 mm	214 mm
Depth	260 mm	100 mm
Weight	< 4.0 kg	< 3.0 kg

R33X ANALOG ACQUISITION (50/60HZ)

Resolution	16 bits
Acquisition Rate	256 ppc
Bandwidth	DC to 3.0 kHz
Attenuation @ 3000 Hz	< 0.1 dB
Attenuation @ 6400 Hz	> 30 dB
Time skew	0 µs
Frequency Tracking Range	Nominal Frequency ±5Hz

R33X VOLTAGE INPUTS (50/60 HZ)

Nominal Voltage (V _n)	115 V
Voltage range	0.02-230 V
Analog Input Accuracy	± 0.1 % of FS magnitude range
Impedance	> 200 kΩ
Burden In	< 0.1 VA
Continuous Overload	230 V (2 x V _n)
Maximum Overload (1 s)	460 V (4 x V _n)

TTL IRIG INPUT

Signal	IRIG-B004
Minimum voltage input	4.20 V
Maximum input voltage	9.80 V
Impedance	> 500 kΩ
Connector	PCB pluggable
Isolation Level	1.44 KVdc

R33X CURRENT INPUTS (50/60 HZ)

Nominal Current (I _n)	1 A	5 A	5 A (Meas.CT)
Current range	0.01... 20 A	0.25... 100 A	0.01... 14 A
Analog Input Accuracy	± 0.1 % FS	± 0.1 % FS	± 0.1 % FS
Impedance	15 mΩ	3 mΩ	15 mΩ
Burden In	< 0.02 VA	< 0.1 VA	< 0.02 VA
Continuous overload	10 A (10 x In)	20 A (4 x In)	10 A (2 x In)
AC current thermal withstand (I _{th} rms for 1 sec)	32 A (32 x In)	160 A (32 x In)	32 A (6.4 x In)

R33X CURRENT CLAMP INPUTS

Nominal Current (I _n)	100 mA (Clamps)
Current range	0.005 ... 0.1 A
Analog Input Accuracy	± 1 % FS
Impedance	1 Ω
Burden	< 0.01 VA
Continuous Overload	0.5 A
Maximum Overload (1 s)	2 A

R33X DC TRANSDUCER INPUTS

Full Scale	± 10 V	± 20 mA
Input range	- 10 to + 10 V	- 20 to 20 mA
Analog Input Accuracy	± 0.1 % of FS magnitude range	± 1 % of FS magnitude range
Impedance	> 5 kΩ	10 Ω

R33X DIGITAL INPUTS

Nominal Voltage	125 Vdc	250 Vdc	24 / 48 Vdc
Level Low	40 V	110 V	08 V
Level High	85 V	170 V	17 V
Impedance	82 kΩ	180 kΩ	15 kΩ
Burden	< 0.25 W	< 0.5 W	< 0.2 W

R33X CURRENT CLAMP

Manufacturer / Model	AEMC / MN312
Dynamic range	0.1 A ... 100 A
Frequency response	40 Hz ... 10 kHz
Accuracy	2 % ± 0.02 mA (0.1 to 1 A) 1 % ± 0.02 mA (1 to 80 A) 2 % ± 0.02 mA (80 to 100 A)
Jaw opening	21 mm
Maximum conductor size	20 mm
Weight	180 g
Operating temperature	- 10 ... 55 °C

GE Grid Solutions

Reason Product Line

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