

RX-33

**Advanced Power & Energy
Measurement Technology
Perfection!**

Xytronic Three-Phase Reference Standard



Radian Research RX Reference Standards
Guaranteed Accuracy $\pm 0.01\%$

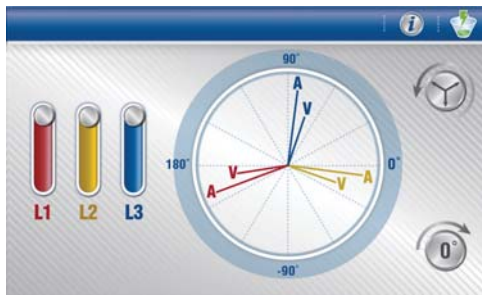


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PRODUCT HIGHLIGHTS: Radian Research is committed to providing our customers with leading innovative and technologically superior products, while maintaining metrology capability in power and energy measurement that is surpassed by none. Our engineers drew on the expertise and knowledge we acquired for our industry-leading legacy RM (Metronic) and RD (Dytronic) reference standards to develop the RX (Xytronic), the ultimate in power and energy measurement technology perfection.

Extended Measurement Range The RX is designed to operate over a broad Current, Voltage and Power Factor measurement range. A dynamic range of 30 VAC - 600 VAC and 5 mA – 200 A provides the versatility to operate in a multitude of power and energy applications. The AC direct current input provides fixed impedance (0.0005 Ohm) over the entire AC current input range. This capability is key to applications that require a fixed input burden and accurate yet fast measurement speed. The RX provides three-phase fully auto-ranging, simultaneous four-quadrant precision measurements, computes, records and presents instantaneous metrics. The RX allows the user to do more with a single instrument.



VECTORS

Internationalization The RX is designed for a global market where user languages may vary. The RX accommodates different languages as well as selectable VAR calculations and a broad range of energy measurement metrics including fundamental only Watts, VA and VAR. RX VAR calculation modes include Voltage 90 degree shifted, Integral VAR, Integral VAR 50 Hz, Integral VAR 60 Hz, RMS VAR, and Fundamental VAR.

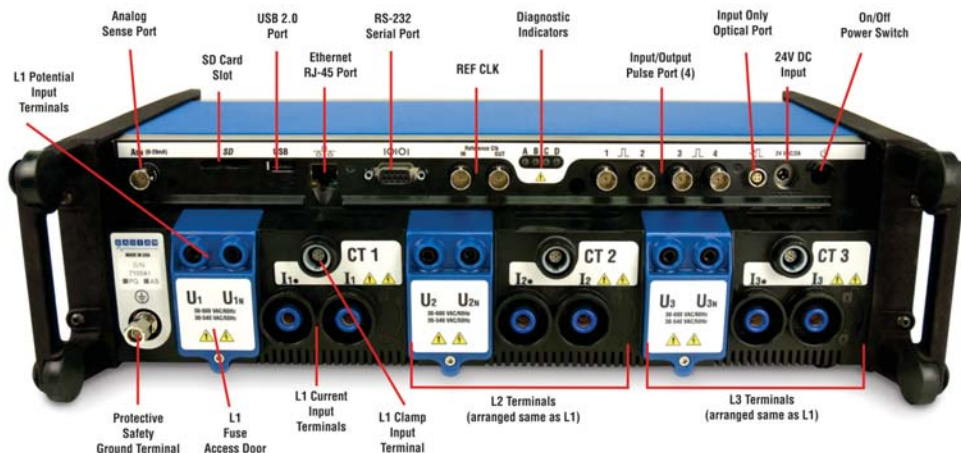
- **Extended Measurement Range**
- **Accurate in Extreme Environments**
- **Meets IEC 61010 – CAT IV/600V**
- **Extraordinarily Versatile**
- **Exceptional Value**
- **Expanded 17025 Accreditation, Service & Support**
- **1,000,000 Samples/Second Processing**

Accurate in Extreme Environments Most Power and Energy reference standards are designed to maintain accuracies in a temperature controlled laboratory environment. Not the RX, it is at home in a temperature controlled measurement lab and at a test site where the environment is outside the operator's control. Radian's confidence in the RX design is supported by the guarantee that it will meet class accuracy at specified temperature extremes. You can test with confidence when using the RX.

	L1	L2	L3
\tilde{U} (V)	110.5910	0.591000	0.591000
\tilde{I} (A)	100.3840	2.384000	2.384000
$\angle UI$ (°)	7.132000	7.132000	7.132000
$\angle I$ (°)	2.571000	2.571000	2.571000
F (Hz)	0.631000	0.631000	0.631000
\tilde{P} (W)	10 000.59	5.590 000	5.590 000
\tilde{S} (VA)	9.515 000	9.515 000	9.515 000
\tilde{Q} (VAR)	9.058 000	9.058 000	9.058 000

MEASUREMENT METRICS

Light Weight, Compact... Metrology capability in Power and Energy Measurement that is surpassed by none!



Designed for CE & UL Safety Compliance Operator safety is always a concern of our customers. RX is designed to meet the requirements defined in recognized CE and UL product safety standards. RX users can be assured that when designing the RX, user safety was a top concern and has been enhanced with this new reference standard.

Extraordinarily Versatile Uncompromised power and energy performance over a broad measurement range in a single rugged solution. Whether integrated within a stationary test rack or used as an engineering lab tool, the RX is extraordinarily versatile. Whatever your requirement RX can fill your need.

Expanded 17025 Lab Accreditation Customer Service & Support brand loyalty is built on trust developed over the past 35 years of uncompromised product design and manufacturing. Customers world-wide have proven this performance for themselves. Those considering Radian products for the first time can gain assurance from our industry leading measurement uncertainties backed by A2LA, an independent 17025 accreditation assessment agency. See latest scope of lab accreditations at www.radianresearch.com/cert.php.

Maximize Signal Processing The RX uses the latest Digital Signal Processing (DSP) technology incorporating nine high speed 1,000,000 samples/second A/D converters. In addition, the flexibility of frequency domain processing algorithms optimizes measurements for the specific signal parameters of interest.



PROGRAMMABLE PORTS

General

Dimensions 4.5”(114mm), 15.5” (394 mm), 7.5” (190 mm)
 Weight 15 lbs (6.8 kg), Shipping weight 24 lbs (10.8 kg)

Environment

Ambient Temperature Range Storage... -40° C to +80° C
 Operating... -20° C to +65° C
 Specified Accuracy... 0° C to 40° C
 Humidity 0% to 95% Non-condensing
 Max. height above sea level 2,000m
 Vibration All Non-destructive
 Supply Voltage 24 Vdc ± 10%
 Power Consumption ~25 VA max.
 Typical AC/DC Power Supply AC Input 100 to 240V, 50 to 60Hz
 Warm-up <60 Seconds

Safety

IP Class IP30 (According to DIN EN 60529)
 International Compliance CE directives: Low Voltage 2014/35/EU (IEC 61010-1, -2-030)
 Electromagnetic Compatibility 2014/30/EU (IEC 61326-1, -2-1)
 ROHS 2 2014/30/EU
 Overvoltage Category Voltage Measurement CAT IV 600V
 Overvoltage Category Current Measurement CAT IV 600V
 Hi-Pot & Surge IEC 61010-1
 Fused Potential Input 500 mA Ultrafast - SIBA 70.172.40.0.500 or Equivalent

Interface

Touch Screen Color Display: Integrated 4.3”, Backlit LCD Color Screen
 (Optional External Touch Screen Display Available)

I/O Ports:
 Communication Interface Port / Protocol Serial RS-232 / Supports Radian Legacy RD Commands
 Ethernet / Standard Commands for Programmable Instrumentation (SCPI) Protocol

Memory Internal (Max. Storage 2,000 Mbytes)
 External SD (Max. Storage 32 Gbytes)
 External USB

External Monitor Port Front Panel Video (Optional Monitors Available)
 External Touch Screen Port USB 2.0
 Optical Sensor Port 4 Pin Lemo (Optional Optical Accessories Available)
 Output Reference Clock 10/20 MHz selectable, 5V TTL compatible

CT Ports	See Radian Web Site for available compensated and uncompensated current clamps.
Bidirectional Programmable Pulse/ Frequency Comparator BNC Ports	Input Termination 128 Ohm/1 KOhm Pull Up to 5 V, Max External Pullup +27V Input Gate rate 200 nS Pulse Width Minimum, Maximum 20 Hz Repetition Rate
Outputs 1, 2, 3 & 4: (Default = 0.00001 Wh/Pulse)	Short Circuit Tolerant. Programmable Kh Value Nominal 5 V, Open Collector Compatible, Max. 27V Max. 2.1 MHz (200nS Pulse Width Minimum) Selectable Watt Hours, VAR Hours, VA Hours.
Direct AC Current (I) Inputs	Range: 1 mA to 200 Amp <500μOhm Input Impedance Termination: 6 mm Female (≤120 Amp) or Male CONLOC (≤ 200 Amp), Optional Current Cable Termination and Adapters available
Indirect Current (External CT Input)	Max. input: 1 Amp Termination: 7 Pin Female Redel Connector
Potential (U) fused Inputs	Range: 30 V to 600 V (60Hz), 30 V to 525 V (50Hz) 1M Ohm Input Impedance Termination: 4 mm Female Protection: 500mA Fused
Cable Accessories	Legacy cable locking adapters (supplied) AC to 24 DCV Converter (supplied) 3 pair 1m Potential Cables (supplied) Unterminated 120A or 200A Locking Current Cables (Optional)
Analog Sense (RX-AS) Option	-20mA to +20mA DC max., BNC Input, Accuracy 0.02% + 1μA

RX Specifications

Function	Reading	% Accuracy (ppm) ^{3,9} TCAL ¹ ±5 °C	% Accuracy (ppm) ³ at Power Factor=1	Stability (ppm √ Month)	17025 Cal Uncertainty (ppm)	Temperature Coefficient ⁷ (ppm/°C)
		RX-33	RX-33	RX-33		
Potential (U)	30 V to 600 V ⁶	0.005% (50)		2	30	1.5
Direct AC Current (I)	20 mA to 200 A ²	0.007% (70)		3	50 ⁸	3
Power ^{4,5}		0.01% (100)	0.005% (50 ppm)	4	50 ⁸	5
Energy ^{4,5}		0.01% (100)	0.005% (50 ppm)	4	50 ⁸	5
Phase Angle	0° to 360°	0.003°				
Frequency	45 Hz to 65 Hz	0.0001% (1)		0.3		0.05

Notes:

- ¹ TCAL = 23 °C
- ² 5mA to <20mA Derated to 0.02%
- ³ Total Expanded Uncertainty in accordance with ISO/IEC Guide 98-3:2008
Includes variables of Stability, Crosstalk, and Traceability Uncertainty
Accuracy represents expanded uncertainties expressed at the 95 % level of confidence using a coverage factor of k = 2
- ⁴ For Power Factor < 0.5, ± (0.1% / PF) Maximum
- ⁵ For ≥ 1 Second Integration Time
- ⁶ Maximum 30 V to 525 V at 50 Hz
- ⁷ Maximum 0 °C to +40 °C
- ⁸ For Power Factor = 1 Cal Uncertainty = 30 ppm
- ⁹ Related to Active Power with Power Factor from 1 to 0.5ⁱ and from 1 to 0.5^c

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