Radian Research, Inc.

RS-933 Power & Energy Automated Calibration System

- *Wide Current Range 1mA to 200A from One Output*
- *50ppm Accuracy*
- *Automated Testing of 16 Meters Simultaneously*
- *Two Year Warranty*
- *Unlimited Wave Forms using Built-in Arb Function*
- *Efficient Calibration using Radian's RD-22 AC/DC Transfer Standard*
- *GPS Time/Frequency Synchronization Pass Through*

OVERVIEW

The RS-933 automated energy calibration system calibrates a range of test equipment including; Energy Reference Standards, Digital Multimeters, Phase meters, Energy meters, Power meters, Revenue meters, Amp meters, Panel meters & Power Quality meters.

Its ability to deliver 1mA to 200A from one single output offers a versatile solution that reduces test time by eliminating the need to reconfigure test leads. Radian's direct drive current output technology improves stability, repeatability and settling time without the need for measurement feedback found on older equipment.

The system achieves a guaranteed accuracy of 50 ppm, this delivers a superior calibration solution to address a broad range of workload.

The RS-933 has the ability to create user defined waveforms. Independent Voltage and Current harmonics relative to the fundamental are established using the software provided.

The system automatically tests up to 16 meters simultaneously maximizing throughput and reducing labor costs.

For meter qualification applications, the system's ability to deliver signals that help determine cross talk, drift and harmonic distortion simplifies and reduces test time.

With over 36 energy parameters including, multiple VAR-hours, the versatility of the RS-933 delivers a wide choice of functions necessary to meet today's laboratory calibration requirements.

With increasing demand for 'real world' simulation the system provides the flexibility to choose single or multiple phases with harmonic control of each independent phase and axis.

The RS-933 software provides full automation and documentation control. The familiarity of the Microsoft Windows based solution shortens integration time and reduces training needs.

System efficiency is further enhanced using TCP/IP interface protocol making control and data access available from your company network. This control allows test data to be accessed at any local or remote terminal.

The RS-933 is based on Radian's proven Syntron technology, continual development offers unparalleled performance across a wide range of functions.

Routine verification and system traceability can be achieved using the Radian RD-22 AC/DC transfer standard. Preprogrammed calibration routines within the software offer a simple but unique solution to reducing system downtime and costly maintenance.

A dedicated 20 MHz Reference Clock pulse output offers external measurement system synchronization. Furthermore, the system is able to synchronize to an external GPS Frequency Standard. The 1 pps external signal can be routed to any of the data outputs enabling simplified UUT time/frequency calibration.

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The RS-933 Syntron Automated Calibration System

The RS-933 provides accuracy, precision, stability, along with efficiency in operation . The RS-933 features, diverse functionality and energy measurement accuracy deliver flexibility that meet the demands of today's metrology laboratory.

Optimum Testing Efficiency

Increased productivity resulting from optimum testing efficiency make the RS-933 the ultimate approach to watthour reference standard testing. Automated results calculation, automated saving of data, unattended testing capabilities, and the ability to test up to 16 meters at one time will reduce test times from days to hours. Efficiency is further enhanced by the Test Group feature of the RS-933. This feature allows multiple test sheets to be run sequentially on the same device(s). Test Groups can also run unattended allowing for greater testing productivity even during non-working hours.

Simple Operation

While sophisticated in its internal functioning, the RS-933 system is very simple to operate. The system was designed so that a new user could be up and running after a brief training session. The intuitive Windows based RS-933 Control Program was developed with ease of use as a primary objective.

Testing Standardization

Utilizing Radian's patented Syntron technology, the RS-933 serves as a sourcing standard by synthesizing voltage and current waveforms of extreme precision and accuracy. These waveforms are then amplified and applied to devices under test. This state of the art approach to watthour reference standardization allows for unsurpassed accuracy and linearity across the system's entire operating range making it ideally suited as a working primary reference system. Traceability of the RS-933's measurement accuracy is maintained directly through Radian's NIST traceable calibration laboratory.

Expansive Testing Capabilities

The system not only has the ability to run accuracy certifications on watthour standards and evaluation testing of solid state meter designs, but it will also test various other devices such as Reference Standards, Digital Multimeters, Phase meter, Energy meters, Power meters, Revenue meters, Amp meters, Panel meters & Power Quality meters with extreme accuracy and precision. The RS-933's expansive set of measurement functions streamlines the workings of electric utility laboratories. The ability for personnel to test many instruments on one central system and then access from any network terminal allows for optimization of test data storage, personnel resources and training times.

The RS-933 with RD-22 Provide a Complete Automated Reference System

For a complete automated AC reference test system, it is recommended that the RD-22 Dytronic Primary Transfer Standard be used in conjunction with the RS-933 Automated Calibration System.

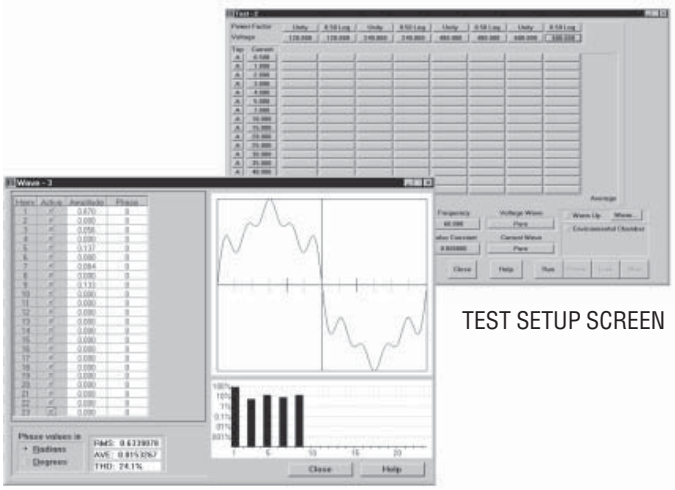
A computer with Control Panel software is serially connected to the RD-22 and will receive processed measurement information from the standard. The portable standards being tested will have their pulse outputs connected to the Data Collection Module.

At the conclusion of the test, the Control Program software will display test results (in percent error or percent registration) comparing the RD-22 to the unit being tested, as well as results comparing the RS-933 to the RD-22.

In this manner, the RS-933 and RD-22 working together effectively serve as a check and balance to the proper functioning of the test sequence. If three RD-22s are used, then the RS-933 has the ability to average the three references as though they were one unit thus increasing the measurement integrity. In addition, primary references of DC Voltage, Resistance and Time can be tested against the RD-22. This is a useful feature for those laboratories that desire to perform a DC to AC transfer.

RD-22 Dytronic Primary Transfer Standard

System Highlights



TEST SETUP SCREEN

WAVEFORM EDITOR SCREEN

- *1mA minimum for new ANSI-compliant startup testing*
- *Automated Testing of 16 Meters Simultaneously*
- *Two Year Warranty*
- *Full Integration with the RD-22 Primary Standard for the Ultimate Calibration System*

Rack Mount Modular Design

RS-933 Syntron Automated Calibration System

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Technical Specifications

RS-933 Power & Energy Automated Calibration System

NEW SYSTEM CONFIGURATIONS

Model Number	New System Configuration Description
931/8C/120A	Single phase, 8 channel data collection, 120amp
933/8C/120A	Three phase, 8 channel data collection, 120 amp
931/8C/200A	Single phase, 8 channel data collection, 200 amp
933/8C/200A	Three phase, 8 channel data collection, 200 amp
931/16C/120A	Single phase, 16 channel data collection, 120amp
933/16C/120A	Three phase, 16 channel data collection, 120 amp
931/16C/200A	Single phase, 16 channel data collection, 200 amp
933/16C/200A	Three phase, 16 channel data collection, 200 amp

OPTIONAL SYSTEM ACCESSORIES

Model Number	Description
RD-22	Primary Transfer Standard
RM-DS/s	Meter Disk Sensor + Shop Mount to test meters
RM-DS/sm	Meter Disk Sensor + Suction Mount to test meters
RM-DS/f	Meter Disk Sensor + Field Mount to test meters
RM-1H	Infrared Optical Pickup to test electronic meters
RM-OA	Optical Adapter for use with a RM-1H to attach to meter com port
RM-KYZ	Pulse Input Adapter (form C contact) to test meters
RM-1B	Signal Converter (converts open collector to driven and driven to open collector – used to make TTL outputs compatible with RS-740)

UPGRADE SYSTEM CONFIGURATIONS

Model Number	Booster Upgrade only Description [1]
703/1P/UPG/120 BOOST	Single phase boost module, 120 amp
703/1P/UPG/200 BOOST	Single phase boost module, 200 amp
703/3P/UPG/120 BOOST	Three phase boost module, 120 amp
703/3P/UPG/200 BOOST	Three phase boost module, 200 amp

Model Number	Data Collection Upgrade only Description [2]
UPG93X/16C DATA	16 channel data collection module

Model Number	RS-600 System Upgrade Description [1] [2]
600UPG/931/16C/120	Single phase, 16 channel data collection,120 amp
600UPG/931/16C/200	Single phase, 16 channel data collection,200 amp
600UPG/933/16C/120	Three phase, 16 channel data collection,120 amp
600UPG/933/16C/200	Three phase, 16 channel data collection,200 amp

Model Number	RS-703A Singlephase System Upgrade Description [1] [2]
703/1P/UPG/931/16C/120	Single phase, 16 channel data collection,120 amp
703/1P/UPG/931/16C/200	Single phase, 16 channel data collection,200 amp
703/1P/UPG/933/16C/120	Three phase, 16 channel data collection,120 amp
703/1P/UPG/933/16C/200	Three phase, 16 channel data collection,200 amp

Model Number	RS-703A Threephase System Upgrade Description [1] [2]
703/3P/UPG/933/16C/120	Three phase, 16 channel data collection,120 amp
703/3P/UPG/933/16C/200	Three phase, 16 channel data collection,200 amp

[1] Requires return to factory [2] Requires new computer platform

SYSTEM SPECIFICATIONS

ACCURACY	Power: ±0.005 %, Voltage: ±0.0043 %, Current: ±0.0063 %, Phase: ±0.003 ° Traceability to NIST for fundamental waveforms This accuracy specification is listed as Percent of Reading and applies across the entire voltage and current range and within a temperature operating range of 23 ° C ± 5 ° C. Accuracy also includes stability, power factor and test system error.
TEMPERATURE COEFFICIENT	Power = 1 ppm / ° C
POWER REQUIREMENTS	240 VAC, 30 A
SUPPLY FREQUENCY	48-62 Hz
OUTPUT RANGE:	
VOLTAGE	63-630 V at 60Hz, 63-525 V at 50 Hz [(10.5)*(F) not to exceed 630V] (0.001 volt increments) (V < 63 V is at linearly derated accuracy) Vout is 150 VA per phase at 120V or higher.
CURRENT	1mA to 200 A
FREQUENCY	47-68 Hz (Fundamental)
PHASE ANGLE	0-360 degrees (0.00001 degree increments)
STABILITY UNDER TYPICAL LOAD	Power: ±0.0035%, Voltage: ±0.0032%, Current: ±0.0044%
PULSE CONSTANT RANGE OF UUT	$1x10^{-11}$ to $9x10^{+11}$
PULSE INPUT	Voltage High: >+1.6 V, Voltage Low: <+1.4 V, Maximum Frequency: <4MHz, Minimum Frequency: 2 microHertz
RECALIBRATION INTERVAL	365 days

PHYSICAL DESCRIPTION

SIZE	(63") **H** x (47.0") **W** x (25.5") **D**
BASE SYSTEM WEIGHT	(775 lbs)
SHIPPING DIMENSIONS	Same as overall dimensions (freight shipment)

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