

Certifying Radian RD-2X Series Reference Standards with the RS703 Laboratory Calibration System



Hardware and Software Requirements

- 1) RD-20, RD-21, or RD-23 Reference Standard (Device Under Test DUT's)
- 2)RS703 Automated Laboratory Test System
- 3)120V VAC Auxilliary Power Input Cable (Radian part no. 194015)
- 4) Right Angle Current Adaptors (Radian part no. 5460060)
- 5) BNC-BNC Input Cable (Radian part no.'s RM-1C, RM-2C, RM-3C)

Any work with the RS-703A Automated Calibration System, RS-703A accessories, energized standards and energized meters can present the danger of electrical shock. The RS-703A and its accessories should be operated by qualified personnel. The information provided in this instruction set is intended to serve as a guide for properly qualified electric utility personnel. This instruction set is not intended to replace existing electric utility safety procedures and those listed in the Handbook for Electricity Metering.

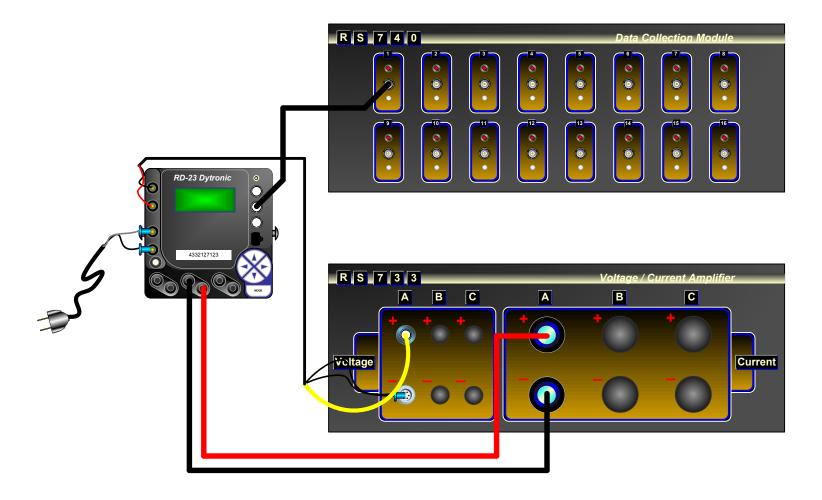
Operation of the RS-703A should not be conducted if the work area is wet or damp. Operation should also not be conducted if flammable gases or fumes are present in the work area. When using the RS-703A never make voltage and current connections/disconnections when the system is live. For service or repairs to the RS-703A contact Radian Research, Inc. Do not attempt to service or make modifications to the RS-703A due to the risk of electrical shock.

Radian Research, Inc. assumes no liability for failure to comply with existing applicable safety precautions as well as those listed in this warning statement.



Hardware Setup

- 1. With the 703 System completely powered OFF, ensure the following:
 - a) the external potential (BNC and LEMO connectors) and current (locking connectors) cables are securely connected to the RS-733 front panel
 - b) the control PC's monitor, mouse, and keyboard are connected
 - c) the 703's main power cable is connected to the power source
- 2. Make all the necessary hardware connections, as shown in the diagram below.





Hardware Setup

2.a. Using a 120V VAC Auxilliary Power Input Cable, apply 120VAC to the DUT's auxiliary power input.

2.b. Using a BNC-BNC cable, connect port two of the DUT to channel one of the RS-740 front panel.

2.c. Using the External Potential Cable, connect the potential output to the DUT's potential input.

2.d. Using the External Current Cable and Right Angle Current Adaptors, connect the current output to DUT's "B" current input.

3. Ensure that the DUT is configured as follows (consult the reference standard's operations manual for details):

a) Port 2: Wh

b) Pulse Constant: 0.00001 Wh/Pulse

c) Port Polarity: "+"

4. Turn the system on by rotating the key switch 90° clockwise. The system will turn on and the cooling fan will start.

5. Turn on the computer by switching both the back and front power switches to the ON position.



Opening Application:

1. Open the 703 Control Software by double-clicking the application's icon, located on the computer's desktop. A pop-up screen will briefly flash on the screen, and a short delay will follow. The control application will then open and proceed with a self diagnostic routine.

2. Wait until the diagnostic routine is completely finished. The application opens with the *Channel Table* window open

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🗷 Channel Table	
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Associate DUT's to Channels:

1. Click on the Channel 1 selection box. A Select Device window will appear.

From this window, select the applicable device name. (If one does not exist for the DUT to be tested, select *New* - Follow the process for creating a new device, located in Appendix 1.) Select *OK*. This action will associate the specific device type with Channel 1.

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7		Voltage Tap Changer	
		Comm Connections:	
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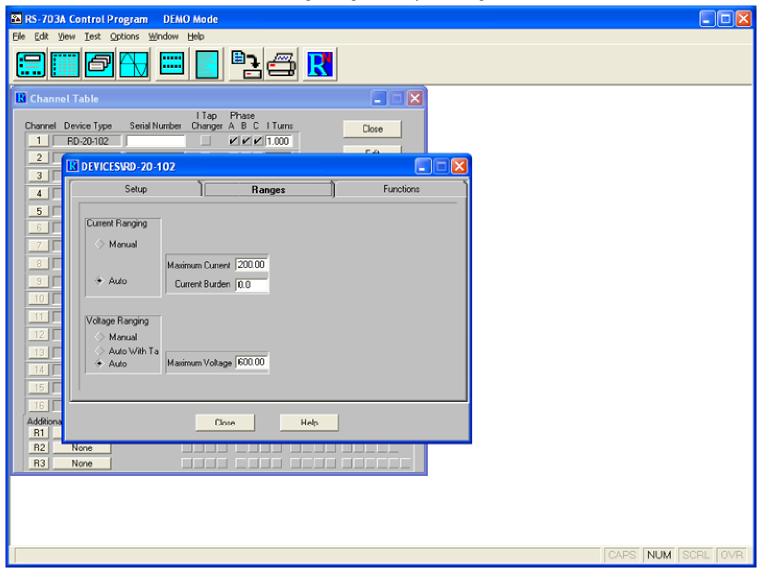
2. Re-click on the *Channel 1* selection box. The associated device's configuration card will be displayed. Ensure that the device is configured as follows:

Setup tab: Device Type: Standard Phases: Single phase Min Pulse Count: 100 Testing Method: Pulse Pulse Output Pullup: 150 Ohms (33ma) Standard Options: Ramp Rates (seconds): Up = 0.7, Down = 0.7

🕰 RS-703A Control Program DEMO Mode	
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Ranges tab: Current Ranging: Auto Maximum Current: as specified by DUT's specifications Current Burden: 0.0 Voltage Ranging: Auto Maximum Voltage: as specified by DUT's specifications





Functions tab: Function: select functions applicable to DUT's supported measurement parameters Pulse Factor: 0.00001 Tolerance: as specified by DUT's specifications Measurement Modes: check Wye only

🖾 RS - 703A. Control Program 🛛 DEMO Mode	
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- Select *Close*. If prompted, save any unsaved changes.
 Enter the DUT's serial number.

🖾 RS-703A Control Program DEMO Mode	
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5 Disconnect All 6 Help	
7 Voltage Tap Changer 8 Comm Connections:	
16 Refresh	
Additional results: S/N or Ref 1 2 3 4 5 6 7 8 9 10 11 12 13 14 R1 None Image: Signal and Si	
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5. Ensure that *I Tap Changer* is unchecked, only *Phase A* is checked, and *I Turns* is set to 1.000.



Test Setup:

1. From the icon menu bar, select the Open a Test icon. A Open window will appear.

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5		Disconnect All
<u>6</u>]		Help
7		Voltage Tap Changer
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R2 None		
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SC Standards Volt meter		New
List Files of Type Test		Help



2. From this window, select *"Radian Standards"* from the list provided. Select *OK*. The selected *Test* window will appear, with the previously associated DUT's serial number listed on the right-hand tabs.

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3. This *Test screen* will include all the test points to be executed. Any of the Current, Voltage, and/or Phase values can be modified by clicking on that particular value.

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4. Ensure that the test options are configured as follows:

Phase: A Point Order: select per user's preference Function: Wh - Watt Hours Net A-B phase: 0.0 A-C phase: 0.0 Consecutive Voltage: unchecked Consecutive Current: unchecked Stabilization Time: select per user's preference Test Time: select per user's preference Frequency: 60.000 (US); 50.000 (International) Pulse Constant: 0.00001 Voltage Wave: Pure *see Appendix 3 Current Wave: Pure *see Appendix 3 Warm Up: unchecked



Running A Test

1. Select *Run*. The test will automatically start with the first test point and continue until all test points have been executed.



Saving, Veiwing, and Exporting Results Data

- 1. Once the test is complete, the resulting test data will automatically be saved in the 703's results database.
- 2. To view the results data, select the View test results icon. This will open a Report window.

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2.a. From the *Serial Number* drop-down menu, select the desired serial number.

RS-703A Control Program DEMO Mode	
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2.b. From the *Date* drop-down menu, select the desired date. The desired results data will appear.

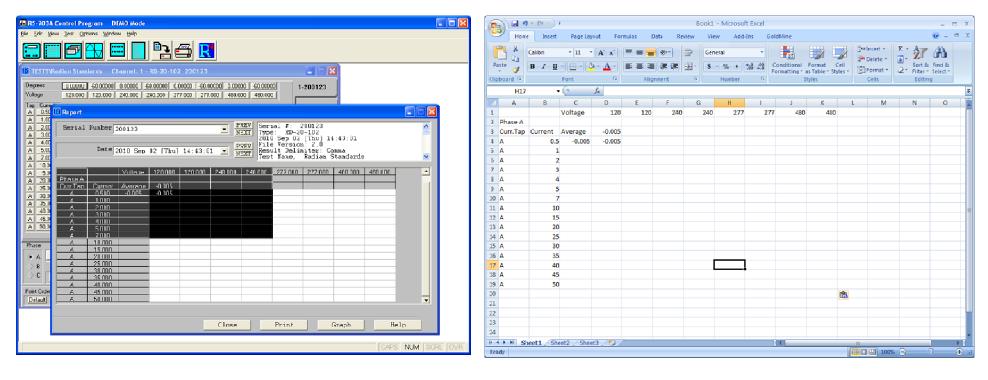
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Saving, Veiwing, and Exporting Results Data

3. To export the data into an Excel spreadsheet, use the mouse to highlight the entire test results grid. Copy the data by simultaneously pressing the [Ctrl] key and the [C] key.

- 4. Open a new Microsoft Excel spreadsheet.
- 5. Paste the data by simultaneously pressing the [Ctrl] key and the [V] key.





- 1. To create a new test device, click on the *Channel 1* selection box.
- A *Select Device* window will appear.

B RS-703A Control Program DEMO Mode	
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🔣 Channel Table	
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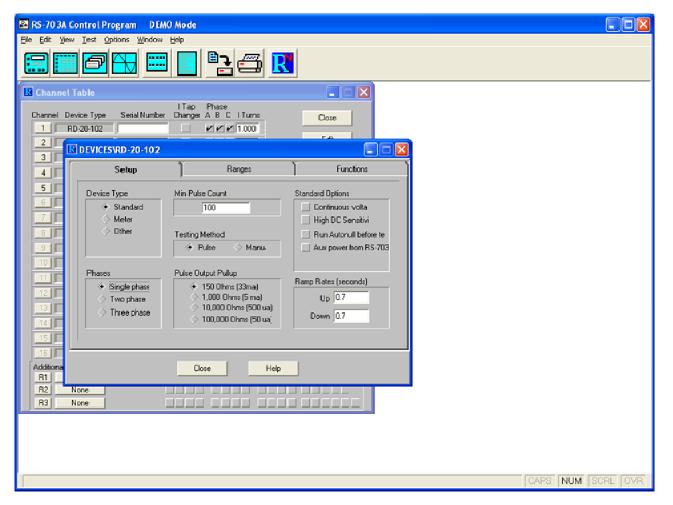
2. From this window, select the New button. A new device configuration window will appear.

Select Device		
Device name: Email_Q4 RD-20-001 RD-20-002 RD-20-032	Directories: Radian Cal Devices Meters Radian Cal Devices Radian Standards Scientífic Columbus	OK Cancel
RD-20-102 RD-20-103 RD-20-104	Scientific Columbus	New
List Files of Type Device		Help



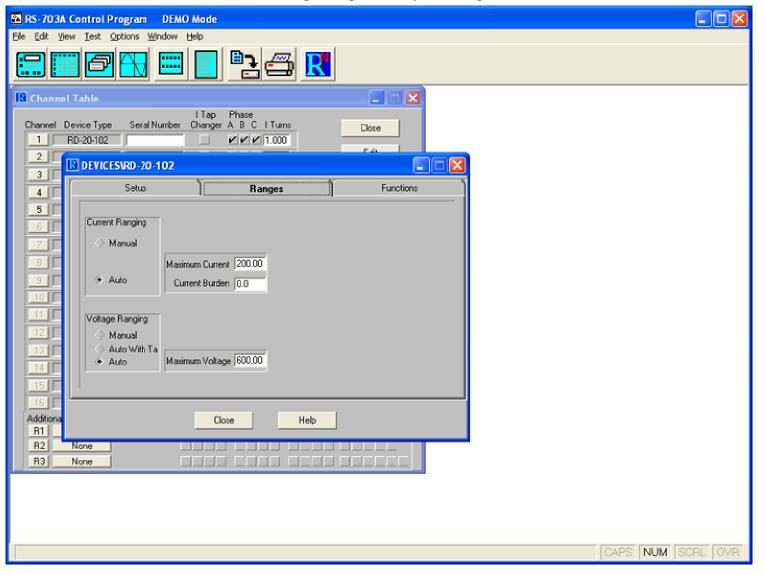
3. Ensure that the device is configured correctly:

Setup tab: Device Type: Standard Phases: Single phase Min Pulse Count: 100 Testing Method: Pulse Pulse Output Pullup: 150 Ohms (33ma) Standard Options: Ramp Rates (seconds): Up = 0.7, Down = 0.7





Ranges tab: Current Ranging: Auto Maximum Current: as specified by DUT's specifications Current Burden: 0.0 Voltage Ranging: Auto Maximum Voltage: as specified by DUT's specifications





Functions tab: Function: select functions applicable to DUT's supported measurement parameters Pulse Factor: 0.00001 Tolerance: as specified by DUT's specifications Measurement Modes: check Wye only

💀 RS-703A Control Program 🛛 DEMO Mode	
File Edit View Test Options Window Help	
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3 Setup Ranges Functions	
5 Function Puise Factor Toleranc 6 Wh 0.00001000000 0.0000 7 Wh 0.00001000000 0.0000 8 0.00001000000 0.0000 Integral VAR hours S0Hz fixed is an accumulating measurement of reactive energy. With his function the voltage as is integrated such that the voltage as is 30 degrees delayed from the VARh INT 50 10 VARh -0.000010000000 0.0000 VARh INT -0.000010000000 0.0000 11 VARh INT -0.000010000000 VARh INT -0.000010000000 0.0000 12 VARh INT -0.000010000000 0.0000 VARh INT -0.000010000000 0.0000 WYE WYE 13 VARh INT -0.000010000000 0.0000 WYE WYE WYE 14 VARH INT 60 - - DELTA: DELTA DELTA Total Active and the set and th	
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4. Select Close. If prompted, save any unsaved changes.



Appendix 2: Options/Configure Menu

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This screen allows the user to select how the resulting data will be displayed, the file type, the number of significant digits in the results data, and the company name.

This screen allows the user to select the type of test (standard and polyvariable), the phase relationships, the test point order, the time-out delay, the power factor display, and the averaging method.



Appendix 2: Options/Configure Menu

Configuration	
Result	Test Hardware Comm
Active Phases	Optional Equipment T ap Changers Meter Adapter Env. Chamber Chamber Type Wattlow Chamber Com Port: Com 1 ▼ Chamber 3 KR-CF RR-CR Com Port: Com 2 ▼
ок	Cancel Help

Result Test	Hardware Comm
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M-PCA Rev 2 cable D-xx Direct	🗌 Com 4 🗹 Com 11 🗌 Com 18

This screen allows the user to select the active phases and configure a temperature chamber control.

This screen allows the user to configure the serial communications to the devices under test.



Appendix 3: Creating Voltage and Current Signals with Harmonic Content

1. Click on the Open a Wave icon. A Open window will appear.

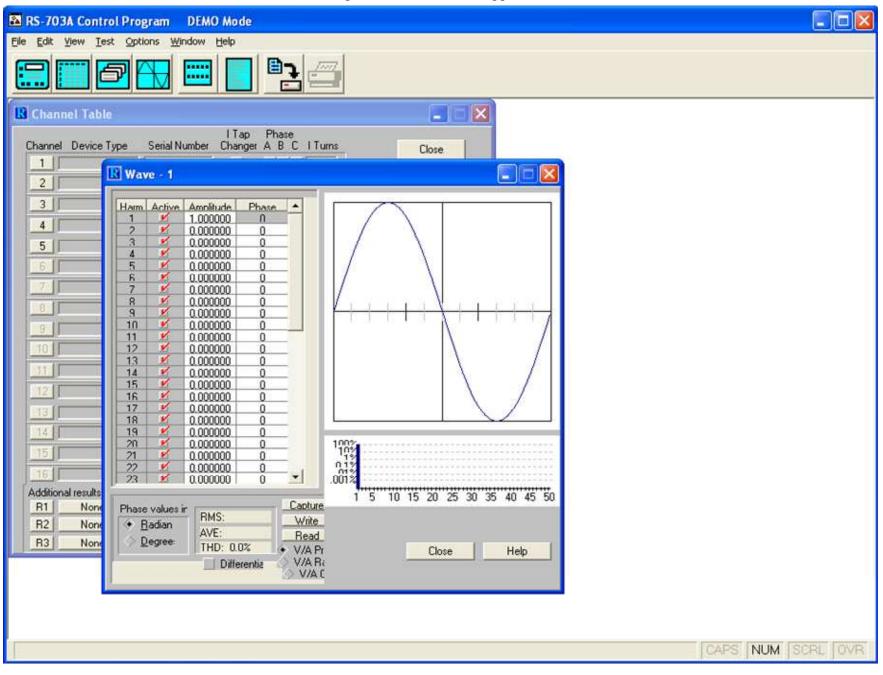
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Appendix 3: Creating Voltage and Current Signals with Harmonic Content

2. Select the New button. A new Wave configuration window will appear.





Appendix 3: Creating Voltage and Current Signals with Harmonic Content

3. Enter the harmonic amplitude and phase parameters. The displayed waveform will change accordingly. Select the *Close* button and save changes when prompted.

RS-703A Control Program DEMO Mode	
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Channel Table	
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