



*Unparalleled Testing Versatility*  
Test any Reference Standard  
Test any Watthour Billing Meter  
Test any Test Board

*Optimum Testing Efficiency*  
Eliminate Manual Recordkeeping  
Calculate/Display Test Results  
Store/Upload Test Data  
Preset Test Configurations

*Compatible with all Radian Pickups*  
Infrared and Visible Light  
Disk Rotation  
KYZ Pulse

*Simple Operation*  
Light, Compact Package

## OVERVIEW

The Radian Research RM-111 Automated Comparator is the definitive test accessory for use with Radian reference standards. The RM-111 eliminates manual calculation and recordkeeping associated with two primary applications: field testing of watthour billing meters and laboratory testing of reference standards. The RM-111 uses precise digital counters to count and compare calibration pulses from reference standards and billing meters. Upon entering test parameters, such as Kh and test duration, the RM-111 facilitates the testing process then calculates, displays and stores the results of the test. The RM-111's versatility enables strategic automation of field and lab testing operations while maintaining compatibility with existing test equipment.

In the field, the RM-111 provides for convenient and cost effective testing of solid state and induction meters. The RM-111 facilitates the test by prompting the user for needed input then automatically calculates and displays test results in the format of % registration or % error. Results can be optionally stored within the RM-111 and later uploaded to a PC running Radian RS232-Link™ software. The RM-111 eliminates the need for a notebook computer in the field. This flexibility makes the RM-111 an ideal complement to a load box with no built-in computing capabilities.

In the standards lab, the RM-111 automates testing of any electronic or electromechanical watthour reference standards. Up to three standards can be averaged for improved stability and repeatability. Three singlephase standards can be summed by the RM-111 to simulate one polyphase standard. Test results are again

calculated and displayed on the RM-111. Optimum testing efficiency is achieved by interfacing the RM-111 to a PC running Radian RS232-Link software. This combination allows any existing voltage and current source to be transformed into an automated standards testing operation with powerful data collection, calculation and management capabilities.

The RM-111 provides universal compatibility with all existing Radian standards and test accessories. When testing solid state meters, the input pulses to the RM-111 are received via the RR-1H and RM-1H Infrared Optical Pickup (or the RM-1H/v for those meters that use a visible calibration pulse). When testing induction meters, the RM-DS or RR-DS Meter Disk Sensor is used to reflectively sense disk rotations. The RM-DS or RR-DS is available in three different mounting arrangements increasing testing flexibility. Both solid state and induction meters can be tested from their KYZ output with the RR-KYZ or RM-KYZ Pulse Input Adapter.

Further benefit is attained with the RM-111's ability to fully test the accuracy of a meter test board. Using the RM-111 Automated Comparator and a Radian Primary Reference Standard most watthour meter forms can be simulated with unparalleled measurement accuracy. The interface to the test board is achieved via its open collector input or by using an optional RM-1P Electronic Light Valve. Pulse division with user definable divisor ratios round out the applications of the RM-111. As with all Radian products the RM-111 includes a detailed operations manual and is accompanied by a two year warranty.

## Testing Watthour Billing Meters

The RM-111 Automated Comparator totally automates testing of both solid state and induction watthour billing meters. The RM-111 essentially serves as a handheld computer in the field automatically calculating, displaying and saving meter test results. This ability makes the RM-111 a perfect complement to load boxes without any computing capabilities.

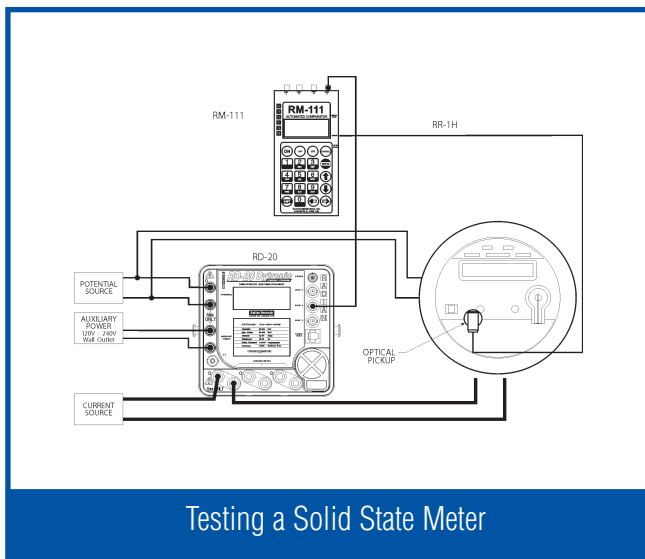


### Flexible Testing Options

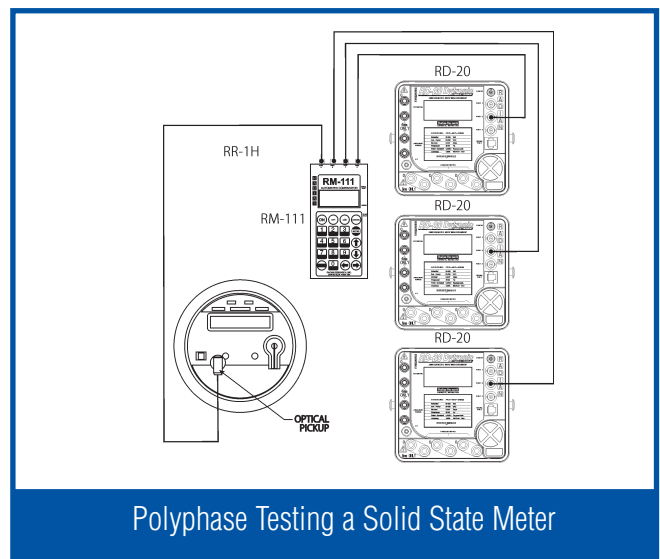
The RM-111 offers unparalleled meter testing flexibility. Optimum accuracy and efficiency is achieved by using Radian test accessories to sense meter disk rotation or calibration pulses of infrared, visible light, or KYZ variety. Testing can also be performed manually by starting and stopping the test from the keypad of the RM-111 or by using an optional RM-1S Remote Reset Switch. True polyphase testing using three Radian standards is greatly simplified with all results automatically calculated. Testing of kW Demand further distinguishes the RM-111 as an invaluable test accessory for field testing billing meters. All modes of testing are optimized by having the ability to create and store test configurations.

### RS232-Link™ Test & Data Transfer Software

The benefits gained from the RM-111 are further increased by using RS232-Link™ Test & Data Transfer Software. Meter test results can be uploaded from the RM-111 to RS232-Link providing paperless recordkeeping. Data is stored and maintained by the serial number of the meter tested. All tests are time and date stamped for optimum maintenance of meter test records. RS232-Link can also be used in the field with an RM-111 for increased capabilities such as custom user fields, automated database import and individual element testing. Whether in the field or in the meter shop, RS232-Link eliminates manual recording, calculation and maintenance of meter test data.



Testing a Solid State Meter



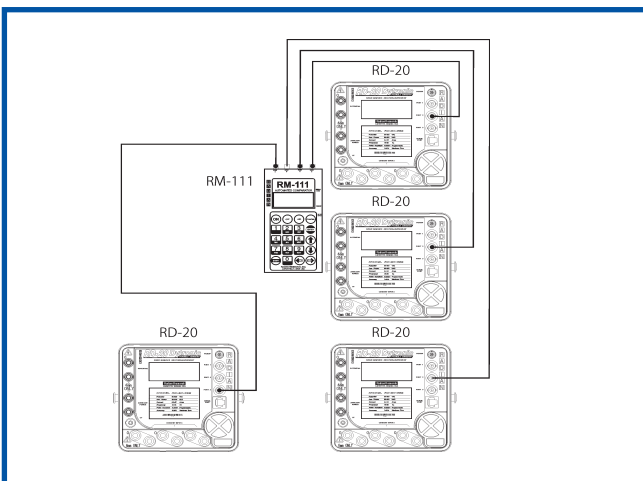
Polyphase Testing a Solid State Meter

## Testing Watthour Reference Standards

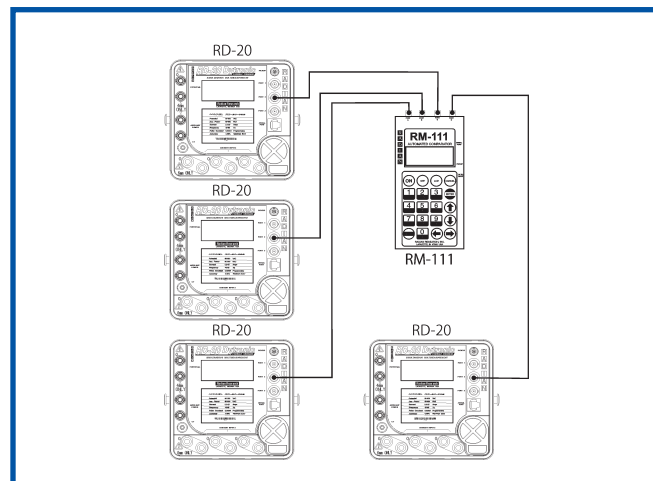
The RM-111 enhances existing laboratory standards and loading systems to provide maximum efficiency, accuracy, and flexibility to the standards testing operation. Test results are automatically calculated and displayed in either % registration or % error format.

### Flexible Testing Options

Testing up to three standards at one time is possible with the RM-111 when using a single reference. The averaging mode allows three standards to be used as a single reference. The summing mode allows three singlephase standards to simulate one polyphase standard. Along with the default pulse count comparison testing method, remote gating of the standard under test is also supported maintaining compatibility with traditional gating test methods.



Testing Three Reference Standards



Testing a Standard Using Three Averaged Reference Standards

# Technical Specifications

## RM-111 Automated Comparator

### Physical

Length:	190mm (7.5")
Width:	105mm (4.0")
Height:	33mm (1.25") approx.
Weight:	0.85 lbs approx.
Case Construction:	Flame resistant ABS plastic with Polycarbonate label / keypad. Keypad good for 1 million cycles.

### Electrical

Power:	9 volt battery or 7-12 VDC adapter
Power Consumption:	171 mW typical, 1.5 W maximum

### Environmental

Temperature:	-20 <sub>i</sub> to 70 <sub>i</sub> C (-4 <sub>i</sub> to 158 <sub>i</sub> F) Normal Operating conditions
Relative Humidity:	0 - 95%
Shock and Vibration:	Any which is nondestructive
Water Resistance:	Unit is splash proof, but not submersible
Orientation:	Any

### Accuracy

Digital Gating	
Total % Error:	Open Collector less than: .0001

### Inputs (Ports A, B, C or D)

Pull-Up:	150 ohm / 1000 ohm, user defined, 25 volts clamped at 33 volts
Frequency:	2.1 MHz maximum per port, 200nS pulse width minimum
Lemo Port 4 Pin:	Lemo connector for RR Sensors

### Outputs (Port D Only)

Type:	Open collector
Imax Pull Down:	100 mA
Vmax Pull Up:	25 volts clamped at 33 volts
Typical State:	Open

### Accessories Available

- RM-1S Remote Reset Switch
- RM-1H Optical Pickup for Infrared LED
- RM-KYZ Pulse Input Adapter
- RM-1P Electronic Light Valve
- RM-1R Potential Gate Relay
- RM-RPP Printer
- RM-DS Meter Disk Sensor
- RR-1H
- RR-DS

### Warranty

Radian Research warrants the RM-111 to be free from defects in material and workmanship. Radian will repair or replace any instrument or component therein which, within two years after shipment, proves to be defective upon examination.

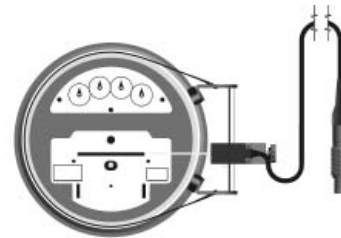
## Test Accessories



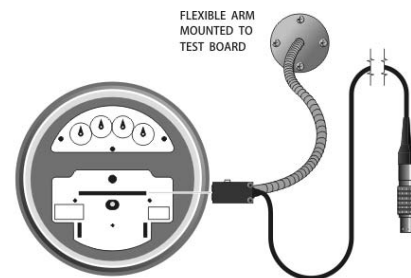
RR-1H Optical Pickup for Infrared LED  
RM-1Hv for Visible LED



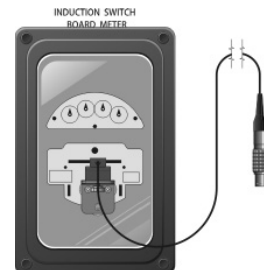
RR-KYZ Pulse Input Adapter



RR-DS/f Meter Disk Sensor (field mount version)



RR-DS/s Meter Disk Sensor (shop mount version)



RR-DS/sm Meter