

RW-30X NS

RW-31X NS

**Three-Phase Customer
Load Field Testing**

Portable Three-Phase Meter Site Analyzer



***Radian Research Reference Standard
Accuracy - Proven***

R A D I A N
**WECO**
Power and Energy Measurement Solutions



Portable Three-Phase Meter Site Analyzer

RW-30X NS RW-31X NS

The next generation RW-30/31X NS Meter Site Analyzer delivers three-phase field-testing utilizing the Radian Research RX series reference standard integrated within the unit. The RW-NS allows you to execute a multitude of tests at the customer's site. Testing the meter with the customer's load, performing CT burden and ratio tests, and verifying system wiring gives you

the peace of mind that the entire metering installation is correct. The RW-NS series also provides for Harmonic Analysis, CT Testing, Vectors, and Trends Testing all without ever pulling the meter from its socket.



Using the RW-NS is a familiar process due to the Microsoft™ Windows® 64-bit operating system embedded within the unit. Large internal storage allows for numerous test results, as well as custom site configuration and test sequences to be saved locally on the RW-NS. The convenient touch screen interface allows instant access to the Winboard Embedded application without the need for an external keyboard, mouse, or monitor. These, however, can be easily connected to the RW-NS, providing you with additional options. A durable screen protector supplies an extra safeguard for the 8.4" LCD touch screen while shielding against glare for better visibility.



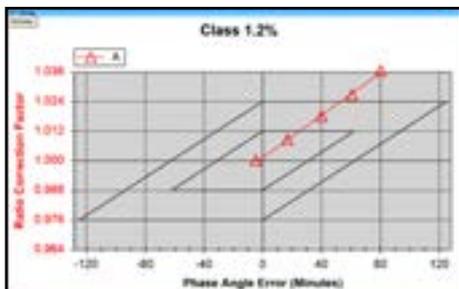
The RW-NS's feature-rich software, designed with user-friendly screens, lead you through installation, wiring checks, customer load testing, and record keeping. Unlimited test profiles, sequences and site configurations may be created and saved. Test results are fully compatible with WECO's industry specific WATT-Net™ software, providing centralized record keeping with data editing and report generation. Data can be exported as Microsoft™ Excel, user-defined, or PDF files.

The RW-NS can perform a complete site analysis which includes Power Quality, Meter Testing, and Transformer Testing. Power Quality performs a Wiring Check to verify correct service wiring. If improper wiring is detected, the operator is prompted to correct the wiring before testing will start. A Vector diagram gives a visual representation of the phase relationships. Primary and Secondary metrics and waveforms along with Harmonic content are displayed in



real-time. Analyze Harmonics through the 60th order providing total harmonic distortion with the amplitude and phase of each Harmonic. With Meter Testing use the customer's load for verifying meter accuracy. Transformer Testing provides burden and ratio accuracy measurement for both current and potential transformers along with demag for Current Transformers.

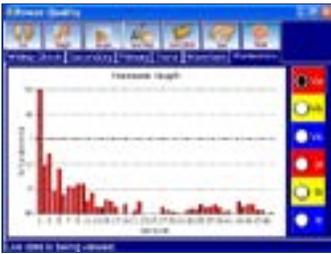
Harmonic waveforms can be recorded in the field. Recorded Harmonic waveforms can also be played back on the WECO 4000 series testboards. Whether sinusoidal or distorted, both types of waveforms are solely under the user's control, and the test parameters can be repeated back at the meter shop.



The RW-30X NS ships with a powerful Radian Research three-phase reference standard, the RX-30, which boasts a 0.04% accuracy margin of error. If your utility demands higher levels of accuracy, then you may choose the RW-31X NS complete with a Radian Research RX-31 supplying 0.02% accuracy. These NIST traceable reference standards ensure a true meter accuracy test is being performed. Optional accessories include compensated current clamps for indirect current measurements.

The RW-30/31X NS packs a lot of features into a small package:

Harmonic Analysis



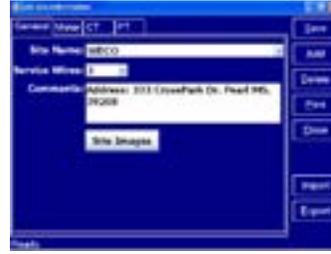
The system's powerful Harmonic Analysis feature displays harmonic data (both RMS and percent of fundamental) for all three phases up to the 60th harmonic as a bar graph or table format.

Wiring Check



Wiring Check allows you to verify the service at a site and get valuable information about the service type, voltages, currents and phase angles. Wiring Check will also alert you to potential problems with the service.

Site Information



Site Information allows you to set up and recall specific information on the devices at a test site such as meters, current transformers and potential transformers. This method of data management keeps you from having to enter information while out in the field. If data is changed in the field the RW-30/31X NS updates the site information database so it's saved for the next time you test the site.

Secondary Check

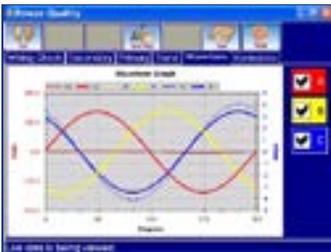


Primary Check



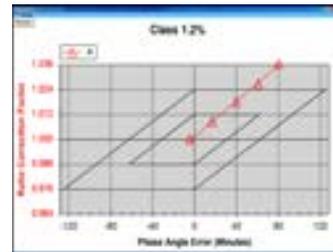
Retrieve data on the calculated electrical quantities for transformer secondaries and primaries of the meter installation with the RW-30/31X NS's Secondary and Primary Checks. Everything from Volts to VARS is measured, in real time, across all three phases for each check. Results are clearly displayed in a color-coded table and can be changed from real time to a snapshot with the click of the stylus.

Waveform Analysis



Waveform analysis gives you the ability to view voltage and current waveform graphs for all three phases. You can view a real time waveform graph for any combination of phases. The interactive graph allows you to zoom in and out as well as retrieve exact numerical measurements by clicking on any point.

CT Testing



Transformer Testing allows for the selection of any combination of ratio measurement and burden testing up to a maximum of 4.0 Ohms. Selected tests automatically run through in a single pass. Numerical results are given which are also plotted on a parallelogram. A separate "Demag" process can be run to demagnetize the transformer under test.



RW-30/31X NS Test Results . . .

are fully compatible with WECO's industry specific meter shop asset management software, WATT-Net, providing centralized record keeping with data editing and report generation.

RW-30/31X NS Accessories All RW-30 and RW-31 accessories are compatible with the RW-30/31X NS.

CABLE SETS:

(BW0157) RW-30 / RW-31 Portable Three-Phase Meter Site Source Analyzer Basic Cable Set

Items (BW0193) and (BW0219) can be ordered to replace the basic (BW0157) cable set.

RW-30X & RW-31X Cable Sets				
Part #	Description	BW0157	BW0219 (EZ-Hook)	BW0193 (IEC)
BW0115	Analog Sense Cable	✓	✓	✓
BW0149	A, B, C Current Cable Assembly - Saf-T-Plugs	✓	✓	✓
CF000076	3 Spare Fuses	✓	✓	✓
CE000040	CAT5 RJ45 Cable	✓	✓	✓
CE110021	Shop Power Cord	✓	✓	✓
CM000180	Nylon Bag	✓	✓	✓
BW0148	Potential Cable w/Alligator Clips	✓		
BW0150	A, B, C Current Cable, Alligator Clips	✓		
BW0151	Field Power Cable, Alligator Clips	✓		
BW0096	Bypass Cables	✓		
CH001003	Test Switch Current Isolators	✓	✓	
BW0216	Potential Cable, EZ-Hook		✓	
BW0217	Current Cable, EZ-Hook		✓	
BW0218	Field Power Cable, EZ-Hook		✓	
BW0191	Potential Cable, 4mm Pins			✓
BW0192	Current Cable, 8mm Pins			✓
BW0190	Field Power Cable, 4mm Pins			✓



(BW0148) RW Potential Cable Assembly Set, 2mm Right Angle Plugs ---- Connect your RW-30/31X into the meter test switch and take control of the amount of potential applied to the meter. Our standard potential leads are 8 ft long with alligator clips which are designed for safety and durability. 1000V, 550mA inline fuses provide over-current protection for the RW voltage channels.

(BW0216) Cable is identical to (BW0148), alligator clips are replaced with EZ-Hook Clips.



(BW0149) RW Braided 'A', 'B', 'C' Phase Current Cable Set with Saf-T-Plugs ---- The current cable set with Saf-T-Plugs connects the RW to the test switch allowing you to read the secondary current of the transformer as well as burden test the current circuit. This is a braided, 3 color-coded (red, yellow, blue) 8 ft cable.



(BW0096) RW Bypass Current Cable Set for Use with Saf-T-Plugs ---- This cable set is used with the Phase Current Cable (BW0149) to jumper around the test switch and inject current into the meter.



(BW0150) RW Braided 'A', 'B', 'C' Phase Current Cables with alligator ---- The current cable set with alligator clips allows you to connect the RW to the current tabs of on a meter test switch. Once connected the RW can control the current applied to any transformer rated meter. This is a braided, 3 color-coded (red, yellow, blue) 8 ft cable.



(BW0217) Cable is identical to (BW0150), alligator clips are replaced with EZ-Hook Clips.

RW-30/31X NS Accessories Continued

CABLE SETS:



(BW0151) RW Field Power Cable ---- Each RW shipment includes a field power cord with alligator clips that connect to the bottom of the test switch, providing a convenient and safe way to power the unit at the site. (BW0218) Cable is identical to (BW0151), alligator clips are replaced with EZ-Hook Clips.



(CE000040) CAT5e RJ45M to RJ-45M Cross-Over Cable, 10 ft, Orange ---- With the supplied Ethernet cross-over cable, it is a cinch to directly connect the RW to an external laptop for control of the unit without having to connect it to a network.



(CE110021) Shop Power Cord, 9 ft 10 in ---- Back at the shop, the AC shop power cord provides a convenient way to power the RW-30/31X from a standard 120VAC power outlet.



(CH001003) Test Switch Current Isolator ---- Don't waste time hunting around the shop for something to use to isolate currents in the test switch. The RW ships with a set of six current isolators that are portable, durable, and provide great current isolation between test switches.



(BW0115) RW Analog Sense Cable ---- The Analog Sense Cable easily clips to the output terminal of a transducer permitting accuracy testing for a wide variety of transducers.



(BW0191) RW Potential Cable Assembly Set, 2mm, Right Angle Plugs ---- Our standard potential leads are 8' long and are terminated with 4mm pins. 1000V, 550mA inline fuses provide over-current protection for the RW voltage channels.



(CF000076) Fuse 6.3 x 32, 500mA 1KV, Very Fast Acting ---- Replacement fuses for BW0191. 3 spare fuses are included with the basic cable set.



(BW0192) RW Braided Current Cables terminated with 8mm Pins ---- This provides the current connections to the meter under test.



(BW0190) RW Field Power Cable terminated with 4mm Pins ---- A convenient way to power the unit at the site.



(CM000180) Partitioned Cable Carryall Bag – 22"W x 9"D x 10"H --- The Carryall Bag with adjustable shoulder strap gives meter testers the ability to grab-and-go. With wash clean surface and ample storage room for all cables and leads this bag is both convenient and portable.

RW-30/31X NS Optional Accessories

OPTICS OPTIONS:



(AW0005) RW OPTOCOM™ Optics Kit ---- Increase the versatility of your field testing with our OPTOCOM™ option. Attach the optic coupler head to properly equipped solid state meter and forget about alignment. When the test is complete, you can program the meter right at the site without having to change out optic heads. Connects to Optics Port 1.



(AW0017) RW Reflect and Solid State Optics with Meter Band Clamp ---- This optics solution combines both reflect optics for mechanical meters and pulse detecting optics for solid state meters in one convenient package. Lock down optics arm, easy mode selection, LED indicators, and a secure grip band clamp make this a valuable addition to any field test kit. Connects to Optics Port 2.



(AW0040) RW Magnetic Mount Optics, Visible, IR and Mechanical Meter Disk Sensor ---- This option combines both reflect optics for mechanical meters and pulse detecting optics for solid state meters into one handy tool. Attach this optics solution with the flip of a switch to any can-mounted meter. The LED indicators and mode selection make testing a snap. Connects to Optics Port 2.



(AC0015) Magnetic Mount Optics Kit, IR and Mechanical Meter Disk Sensor ---- This has been a workhorse for many years, however operation in direct sunlight is a challenge. The AW0017 and AW0040 have been developed to address this issue and will perform in direct sunlight. Connects to Optics Port 2.



(AW0006) RW Solid State Optics Probe Assembly, Suction Cup, IR Detector ---- When you are faced with a meter enclosure that does not accommodate magnetic or clamp based optics use our Solid State IR Optics Probe Assembly with suction cup attachment to detect the meter's IR emitter. Connects to Optics Port 2.



(AW0007) RW Solid State Optics Probe Assembly, Suction Cup, Visible Detector ---- Don't let enclosures that prevent magnetic or clamp based optics attachments keep you from getting quick test results. The Visible Solid State Optics with Suction Cup attachment to make sure you can test meters equipped with visible LEDs. Connects to Optics Port 2.



(AW0008) RW Click Switch Adapter ---- Sometimes optics just are not an option, and that's when you turn to the Click Switch Adapter. Visually observe the disk's rotation and manually register revolutions with the click of a button. Connects to Optics Port 3.



(AW0020) RW Power Cable for Radian RM-DS Meter Disk Sensor ---- This adapter cable plugs into the RW Optics Port 2 to power Radian's RM-DS meter disk sensor. This cable plugs into Optics Port 2. The RM-DS connects to Optics Port 3.



(AW0033) RW Optics Extension Cable, 33 ft (10 meters) ---- When your standard optics cable just is not long enough, utilize our Optics Extension Cable. This cable adds 33 ft (10 meters) to the allowable distance between your optics sensor for the Optics 2 Input and RW. This cable is used with any of the optics that connect to Optics Port 2.

EXTERNAL CURRENT PROBE OPTIONS:



(AW0027) RW 20 amp .47"[12mm] Jaw Transformer Rated Probe Kit, 5 ft + 25 ft Leads ---- This small, compact probe with a .47" jaw opening is used to measure currents from 40mA to 10A, 600 V maximum.



(AW0013) RW Current Probe, 100 amp .47"[12mm] Jaw Transformer Rated Probe Kit, 5 ft Leads + 25 ft Extension ---- The "clothespin" style current probe is most often used for secondary current measurements from 400mA to 100A, 600V maximum.



(AW0014) RW 1000 amp, 2.25" Clamp On Probe Kit, 25 ft Leads, 600 Volts ---- The circular clamp-on probe is used for current measurements with a range of 2.0A to 1000A, 600 V maximum for conductors up to 2.25" maximum.



(AW0028) RW 3000 Amp Square Jaw Probe Kit, 25 ft Leads, 600 Volts ---- This square clamp is great for higher currents, up to 3000A. The square jaw permits multiple conductors or bus bar positioning.



(AW0010) RW AmpFlex® Current Probe Kit , 100/1000 Amps, 1000 Volts, 36 in, 25 Ft Current Probe Extension Cable (AW0018) ---- The AmpFlex® current probe kit includes a flexible current sensor for measurements on conductors where standard clamp-on probes cannot be used. The 36 inch sensor with electronic module and a calibration adapter can measure up to 1000 amps, 1000 V maximum.



(AW0052 - 24 in), (AW0026 - 36 in) RW AmpFlex® Current Probe Kit, 3000 Amps, 1000 Volts, 25 Ft Current Probe Extension Cable (AW0018) ---- The AmpFlex® current probe kit includes a flexible current sensor for measurements on conductors where standard clamp-on probes cannot be used. The sensor with electronic module and a calibration adapter can measure up to 3000 amps, 1000 V maximum.



(AW0011) RW High Voltage **Current** Probe Kit, 2000 Amps, 150kV ---- The high voltage current probe kit includes a fiber optic isolated current probe with 3.85" wide jaw for current measurements of primary conductors above 600V to 150kV. Use to test CT Ratios. Detachable line hanger, adapter and probe with hot stick mounting capability all come in a convenient carrying case.



(AW0059) RW CT Current Boost, 200 Amps, 150kV ---- Use this CT Current Boost module at sites where current is low. For use with through-hole CTs only.

EXTERNAL VOLTAGE PROBE OPTIONS:



(AW0023) RW 600V Voltage Probe Kit for Low Voltage PT Testing ---- The 600V PT Probe allows you to check the voltage on systems that are 600 volts and less, allowing you to verify the potential transformer is working correctly.



(AW0012) RW High **Voltage** Probe Kit, 40kV ---- This high potential kit is a power quality tool for 10kV to 40kV applications. Determine primary voltage from primary conductors. Use to test PT Ratios. A fiber optic link provides the isolation. Kit comes complete with carrying case, hot stick mounting capability, and adapters.

PROBE OPTIONS:

Extensions and Adapters:



(AW0018) RW Current Probe Extension Cable, 25 ft ---- Extend the distance from the RW to the test location by 25 ft with this cable. Connect up to four to increase the overall distance to 100 ft. This option works with all probes listed above.



(AW0019) RW Adapter Kit for Customer Supplied Sensor Link Probe ---- For customers who already own compatible sensor link voltage or current probes, this low cost adapter kit makes it possible to use with your RW. Note: for reliable accuracies, send your probe to Radian for calibration.

RW-30/31X Optional Accessories Continued



RB-IR (110165) Solid State IR Optics Probe Assembly with suction cup attachment based optics.



RB-IR (110166) Solid State IR Optics Probe Assembly with MAGNETIC attachment based optics.

KYZ CABLE OPTIONS:



KYZ Cables:

(AW0009) RW Form-C KYZ Cable Set, 6.5 ft (3 wire front panel jacks) ---- All you need is a KYZ cable set to conduct a KYZ test or use the KYZ connection to test the meter. Three plugs connect right to the RW front panel jacks by standard yellow, black, and red cables with alligator clips to the meter.



Advanced I/O KYZ Breakout Cables:

(AW0022 - 8 ft),(AW0025 - 12 ft), (AA0029 - 18 in) RW Advanced I/O KYZ Breakout Cable ---- This cable is used to connect KYZ outputs from meters into the RW's Advanced I/O Connector. The connector has two Form A input channels that can be independently configured as four Form C input channels. The Advanced I/O Connector also has two Form A output channels and one Form C output channel.

ADDITIONAL VOLTAGE AND CURRENT LEAD OPTIONS:



(AW0046) RW Voltage and Current Cable Alternate Termination Assembly Set, Right Angle, Customer End Unterminated ---- This set includes a RW Potential Cable with right angle, customer unterminated ends and a RW-3X 'A', 'B', 'C' Phase Current Cable with right angle plugs, customer unterminated ends.



(AW0048) RW Voltage and Current Cable Set, Switchboard Meters, 4mm Plugs for Test Paddle Terminations



(AW0049) RW Voltage and Current Leads Extension Kit, 12 ft ---- This extension kit increases the distance from the RW to your test switch by 12 ft. It supports up to 600V and 15A per phase. This also includes a 12 ft optics and optics coupler extension.



(AW0050) RW Braided 'A', 'B', 'C' Phase Current Cables with Open CT Saf-T-Plugs, Right Angle Plugs ---- Right Angle Plugs are highly recommended. The special Saf-T-Plugs have a protection circuit at the test switch connection which will short the CT if an open circuit condition is detected.

RW-30/31X NS Optional Accessories Continued

MISCELLANEOUS OPTIONS:



(AX0023) RW, Barcode Scanner Option ---- The RW's onboard software has been built from the ground up to take full advantage of barcode scanning to save you valuable time when meter testing in the field. With just one scan of a barcode you can automatically enter the meter's faceplate information, load the appropriate test sequence, and recall the last saved results for that particular meter.



(CA000581) TTS-8 Temporary Test Switch for 5S meter ---- This allows you to remove a socket meter, plug in the adapter with the test switch and then plug the meter into the adapter for 5S meters.



(CA000579) TTS-13 Temporary Test Switch for 6S and 9S meters ---- This allows you to remove a socket meter, plug in the adapter with the test switch and then plug the meter into the adapter for 6S and 9S meters.



(MW009401) RW-3x LCD Screen Cover --- The Screen Cover is impact resistant transparent hinged polycarbonate. The cover in lower position is rugged and protects the LCD from scratches and impact. Lifting the cover allows complete access to the LCD.



(CD000025) Protective Anti-Glare Film – 173.5mm x 130.5mm --- Precut to fit exactly the RW 8.4" LCD touch screen makes the protective film ideal for meter testers to easily install. The protective film reduces glare and can be effortlessly remove when replacement is need.

Features and Specifications

- Microsoft Windows® 7, 64 bit operating system
- RW-30X NS: three-phase Radian Research RX-30, 0.04% high-accuracy internal standard recognized and accepted by NIST
- Optional RW-31X NS: three-phase Radian Research RX-31, 0.02% high-accuracy internal standard recognized and accepted by NIST
- Analog Testing using a current loop configuration of voltage, current, phase, power factor, Watt, Var, and VA transducers
All analog devices with a maximum output of +20mA are supported
Supports internal loop power or external loop power transducers
- Fuse protection on all voltage leads at point of connection
- Auxiliary power is protected by the circuit breaker.
- 2 USB ports
- Removable top lid
- 1 VGA port
- 1 Ethernet 10/100 port
- 1 Embedded WiFi Adapter
- 1 COM port
- 1 simple three wire KYZ input
- Advanced I/O port:
 - >> 4 KYZ inputs
 - >> 2 KZ inputs
 - >> 1 KYZ output
 - >> 2 KZ outputs
- Optical communications port
- 5 pin REDEL® connector for meter optical probes
- BNC connector for pulse out (standard pulses or test pulse), click switch input, and external standard compare pulse input
- Pulse LED
- Audio pulse volume control
- 3 voltage status LEDs (1 per phase)
- 3 current status LEDs (1 per phase)
- 3 current transformer clamp-on inputs (1 per phase)
- Power Measurement Error, Indirect Clamp Probe
Active and Reactive; 0.10% Accuracy class
- Per phase potential color-coded safety jacks for potential and current inputs/outputs
- Potential and current distinctively sized safety jacks to ensure effortless accurate connections
- 4 quadrant, 3 phase, simultaneous measurements for active, reactive and apparent energy and power
Functions include:
Watt hours, volts, amps, phase angle, power factor, VAR hours, watts, VA hours, VA, VARS, frequency, forward and reverse energy flow.
- Auxiliary Power Input Range:
90-300V AC, 6 amp breaker
- Input Frequency Range:
45-65Hz (fundamental)
- Case Dimensions and Base Weight:
20"W × 9"D × 16.5"L, 32 lbs
508mm W × 228.6mm D × 419.1mm L, 18.14kg
Removable top lid
- Temperature:
>>0°C to 55°C (32°F to 131°F) operation
>>-20°C to 70°C (-4°F to 158°F) storage
- Humidity:
0%-95% non-condensing
- Warranty:
Two (2) year limited warranty (all parts and labor).
- Service:
All required service on the Model RW-30/31X NS will be completed from the office of Watthour Engineering Company, Inc., a Radian Research Company, located in Pearl, MS. WECO maintains a stock of all components and should a part fail, would in most cases be able to provide a replacement part within 48 hours.

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