# Model AWRMS™ 50

## Automated Winding Resistance & Ratio Measurement System

- Computer Controlled Test System for 3 & 1 Phase
- Power Transformers & Reactors
- Auto Measure feature for performing sequential
- measurements of the Vector Group Detection,
- Ratio and Resistance with automatic tap changer.
- Accurate Liquid & Surface Temperature
- Measurement (20 Channels of 4 Wire) & Monitoring
- Unmatched Speed, Range, & Accuracy and 4 Wire
- Measurements for all Tests
- Heavy Duty & Safe Discharge Circuit

# MODEL INFORMATION

### GENERAL INFO. & MAIN BENEFITS:

The AWRMS 50 is a computer controlled dual source test system for Vector Group Detection, Ratio and Resistance Measurements on medium and large transformers. The maximum current is 50A. The AWRMS 50 was developed as a fully automated system using one set of cables for Hot and Cold Resistance, Ratio and Heat Run Tests with an automatic tap changer capability. Only one set of connections has to be made to support all the measurements. The software controls, measures and supervises all the measurements.

The AWRMS 200 is a computer controlled single source test system developed for Resistance Measurements and Heat Run Tests with an automatic tap changer, the maximum current being 250A.

Up to 20 temperature channels are available on each model.

The AWRMS™ 50 is a very versatile, most accurate, best performing, low cost system on the market, today! For higher currents see our AWRMS 200.

### INDUSTRY APPLICATIONS:

**The AWRMS™ system is primarily used for:**

- Transformer and Rotating Machinery Manufacturers.
- Power Utilities.
- Electric Contractors.
- Govt. and Private Labs, and Service or Maintenance Companies.

### SYSTEM APPLICATIONS:

The AWRMS™ 50 is capable of the testing both the three-phase (Y-Wye, Δ-Delta, or Mixed) and the single-phase power subsystems [(VA to MVA); (fractional HP to kHP or W to MW)]:

- Power and Distribution Transformers [(PTs & Ts) with / without onload tap changer (OLTC)].
- Electric Motors, Generators, and Reactors.
- Busbar Contacts & Joints and Bushings.
- Power Cables, Relays, and Circuit Breakers.

## DESCRIPTION

The AWRMS™ 50 can be used standalone or in conjunction with the MIL's series of AccuLoss™ Loss Measurement Systems. The standard system is capable of performing all measurements in one set up including checking the vector group, ratio and resistance and features an automatic tap changer. Twelve PT100's come standard with expendability up to 40 for measuring oil and case temperatures. There is no need to intervene saving time and money. All measurements are performed in accordance to the IEEE and other International Standards (ANSI, IEC, NEMA, & VDE).

Built into a tough steel enclosure on heavy-duty castors, the system can be moved about easily. Long, current-, potential-, and temperature- measurement cables (up to 30m) are supplied.

Seven current cables (3 each for the high and low side and 1 for the high side neutral) and eight potential cables (4 each for the high and low side including the neutral) are available for connection to a three phase transformer (usage of the neutral cables are optional). Single phase transformers require only four current cables (2 from each side). Current and potential cables have clamps (insulated & color coded for each phase) for easy clipping to the poles of a transformer (UUT).

The same cables are used for both the winding- resistance and ratio measurements. Current and voltage are selected on the two power supplies automatically.

## AWRMS™ FEATURES

### Measurement Capabilities:

Source compliance of up to 60 VDC @ 50A (continuously variable) is used for cold resistance measurements. The hot resistance is automatically temperature compensated for copper and aluminum

windings (using a standard or customized reference temperature).

Resistance range from 1 μΩ to 500 Ω. Ratio from 1 to10,000

### System Accuracy:

4-Wire Measurement Technique allows the use of long measurement leads without sacrificing accuracy.

All the measurements are made very accurately (See the System Specifications at the end).

### Operating Convenience:

The system is computer controlled and fully automated for all the measurements. It requires no

manual intervention when operating in the Auto Mode.

### Exceptional Reliability:

The components used in the AWRMS™ 50 are of the highest quality, and designed and manufactured for a rugged environment.

### Software:

The AWRMS™ 50 Software provided with the system is written in LabVIEW™. The test results are output in a tabular format and an ASCII file for easy import to spreadsheets.

Industry Preference:

Addition to the innovative technology, the AWRMS™ 50's speed and accuracy account for the increased

interest and preferred status among many well known transformer and reactor manufactures.

## BENEFITS

### Modern Technology:

State of the art technology that will meet todays and future testing requirements.

**Fast Measurements:**

Measurements on the primary and secondary of the three phase UUT are done simultaneously. Two power supplies (max: 60 VDC & 50 A), handle even the largest PTs and saturates them within the shortest time. Auto tap changer control signal is available for PTs with OLTC.

**Operating Efficiency:**

A wide range of features specifically tailored for the testing of large PTs are accomplished through a 20 Channel Scanner Matrix (4-Wire). This ensures that all the temperature measurements are automated improving operator efficiency and eliminating human errors.

**Safety:**

An intrinsically safe and heavy duty discharge circuit rapidly dissipates the stored magnetic energy in the UUT after each test. At that time, red warning indications come on the monitor. Over voltage protection is provided on all lines between the system and the UUT.

**Cost Reduction:**

The AWRMS™ 50 is a multi-parameter rack system and costs lesser than other similar systems. Its automated operation improves measurement efficiency and reduces testing cost. The system, very much reduces the maintenance and unexpected shutdown costs.

## SYSTEM HARDWARE

System control and data acquisition and measurement hardware as well as charging and discharging circuits.

- Two powerful supplies (3 kW) enable quick (≤ 40 Sec.) measurements at various test configurations on the UUTs with up to 3 windings with 3 phases.
- Standard test cable length for all measurements to 30m are available.
- Built in industrial grade PC with IEEE 488.2 Interface, LCD Monitor, Keyboard, Mouse, MS Windows, MS Office 2007, AWRMS™ 50 Software.
- Automated Temperature Measurements: Very accurate temperature measurements on 20 Channels are available using 4 Wire RTDs.
- System has ability to accommodate both Thermocouples or Thermistors.
- The standard system is supplied with Six (6), PT100 Standard RTDs for liquid insulates (oil) each with a cable length of 15 m.
- The system is also supplied with six (6) PT100 Standard RTDs for metallic surfaces (magnetic holder type), each with a cable length of 15 m. Longer lengths are available at the time of order. A total of 20 Channels are provided the system can be further expanded up to 40 channels.
- All connections for high current measurements are made at the rear of the AWRMS for both high and low sides of the transformer. Each conductor is color coded. All connections are of the screw on, locking type are used for both resistance and ratio measurements. Standard cables are 10m in length; longer cables are available at time of order.

## SOFTWARE

**AWRMS™ 50 Software Features:**

- User friendly program for hot and cold Resistance measurements.
- The program offers Auto and Manual Modes and flexibility for customization.
- Heat Run Test Software outputs temperature rise or cooling curve results in either graphical or tabular form.
- All results in ASCII file can easily be converted to Word, PDF, HTML, XML, CSV, etc.

## CALIBRATION & VERIFICATION

Items required for calibration are Standard Resistor models 9332 /0.0001, 0.001, 0.01, and 0.1Ω and Model 9331 /10Ω.

| SYSTEM SPECIFICATIONS | |
|---|---|
| Resistance Measurement (Range) Accuracy | 1 μΩ to 10Ω, 0.1% |
| Power Supplies | 2 X 3 kW |
| Max. Test Voltage / Current | 60 V-DC / 50 A (Continuously Variable) |
| Settling Time | ≤ 40 Sec. (Typical) |
| Ratio Measurement (Range & Accuracy) | Ratio 1 to 10,000 ±0.2% (other Ratios are available) |
| Test Voltage / Current | 48, 60, & 100 V-AC / Limited: 2 A |
| Vector Group Detection | 0 to 330° (0, 30, 60 .... 330) ±15° |
| Temperature Measurement | -100° to 400° C ± 0.3° C (RTDs: PT100-Standard Compatible) |
| Measurement Cycle Time | Selectable from Seconds to Minutes |
| | |
| **Environmental Conditions** | |
| Ambient Temperature (Operating) | 0° to 45° C |
| Relative Humidity (Operating) | 20 to 60 % |
| | |
| **General Specifications** | |
| Mains Supply | 240 V-AC (5 Pin) 18.4 kVA 50 / 60 Hz |
| Ambient Temperature (Reference) | 15° to 35° C |
| Relative Humidity (Reference) | 30 to 85% (non-condensing) |
| Size (D X W X H) | 800 X 600 X 1513 mm (31.5 X 23.6 X 59.6 in) (H: Excludes warning light & castor.) |
| Weight | 220 Kg (485 lbs), Cables 45kg (99 lbs) |
| Warranty | 1 Year (Parts & Labor). |

**OPTIONAL ITEMS:**

Power Supplies: Other than 3 kW VDC/50A
Cables (Current & Potential): > 30m
Number of Channels: >20 (4-Wire) or 40 (2-Wire)
Temperature Probes: RTDs, Thermocouples, and Thermistors



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