Measurements International

Metrology is Our Science, Accuracy is Our Business™

AUTOMATED WINDING RESISTANCE MEASUREMENT SYSTEM

- Currents Up to 200A for Performing Winding Resistance and Heat Run Tests
- Heavy Duty Protection Circuit
- Accuracy with Four Wire Measurements 0.1% of Reading + 1μΩ
- Accurate Liquid and Surface Temperature Measurements, 14 Inputs for PT100s/RTDs and 6 Thermocouples
- Two Current Leads and Three Sets of Potential Lead
- User Friendly Software with Auto & Manual

MODEL AWRMS™ 200

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GENERAL INFO & MAIN BENEFITS

The AWRMS™ 200 is a computer controlled test system developed for measuring Transformer Resistance and for multiple temperature points during Heat Run Tests in highly inductive loads. A single source with a 100V DC test voltage is used to saturate even the largest transformer within seconds. A heavy-duty protection circuit dissipates the stored magnetic energy rapidly after the test. An automatic Tap Changer speeds up the measurement of all the windings. Optimum accuracy for the resistance measurements is achieved using the four wire principle of resistance measurement.

The AWRMS™ 200 is capable of measuring the resistance of up to three windings connected in series simultaneously. The DC current of the 25kW supply is continuously adjustable up to 200A for testing windings in large transformers, electric motors, generators and reactors.

Up to 40 temperature channels consisting of PT100s or Thermocouples can be supplied.

INDUSTRY APPLICATIONS

The AWRMS™ system is primarily used for:

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

SYSTEM APPLICATIONS

The AWRMS™ 200 is capable of the testing both three-phase (Y-Wye, Δ-Delta, or Mixed) and single-phase power subsystems [(VA to MVA); (fractional HP to kHP or W to MW)]:

- Electric Motors, Generators, and Reactors.
- Busbar Contacts & Joints and Bushings.
- Power Cables, Relays, and Circuit Breakers.

MODEL AWRMS™ 200

DESCRIPTION

The AWRMS™ 200 can be used in either stand alone or in conjunction with the MIL series of AccuLoss™ Loss Measurement Systems. The system is capable of performing both cold and hot resistance measurements on winding resistance.

Built into a steel enclosure on wheels the AWRMS™ 200 can be moved about easily and effortlessly. Two current cables and six potential cables are available for connection to the UUT. Standard cable length is 20m. Cables up to 30m and longer are available at time of order. The current and potential cables are supplied with clips (insulated and color coded for each channel) for easy connection to the poles of the transformer (UUT). Additional cables are available as an option.

14 PT100's and 6 thermocouples come standard with optional expandability for up to 40 for measuring both oil and case temperatures. At the time of order, you can choose your configuration of either oil or case mounted.

All measurements are fully automatic and require no adjustments. The measurements are performed in accordance to the IEEE, IEC and other international standards.

Several safety circuits are built into the AWRMS™ 200 including overvoltage protection on the output of the DC Power Supply.

AWRMS™ FEATURES

Measurement Capabilities:
A source compliance of up to 100 VDC @ 250A (continuously variable) is used for measuring the winding resistance. The hot resistance is automatically temperature compensated for copper and aluminum windings (using a standard or customized reference temperature).

System Accuracy:
4-Wire Measurement Technique allows the use of long measurement leads for measuring the winding resistance without sacrificing accuracy. (See the System Specifications at the end).

Operating Convenience:
The system is computer controlled and fully automated for all measurements. There is no manual intervention required when operating in the Auto Mode.

Exceptional Reliability:
The components used in the AWRMS™ 200 are of the highest quality, and designed and manufactured for a rugged environment.

Software:
The AWRMS™ 200 Software provided with the system is written in LabVIEW™. The test results are outputted in a tabular format to an ASCII file for easy importing to an Excel spreadsheets. Upon turning the system software on, a built in self diagnostic routine scans each instrument for functionality.

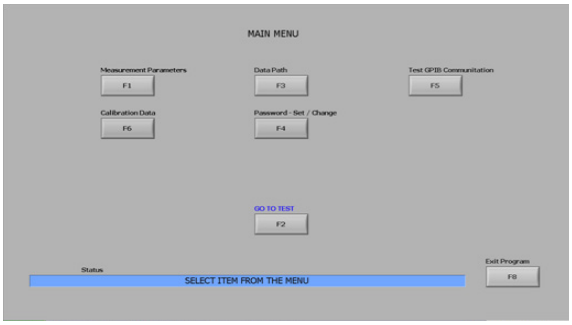
AWRMS™ 200 Software Features:

- User friendly program for hot and cold Resistance measurements.
- The program offers Auto and Manual Modes and flexibility for customization.
- Hot Resistance 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.

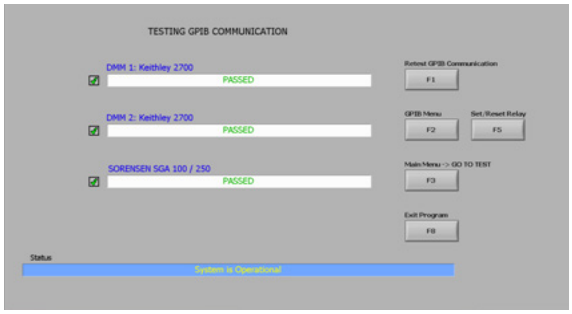
MODEL AWRMS™ 200

The Software Consists of Following Menus:

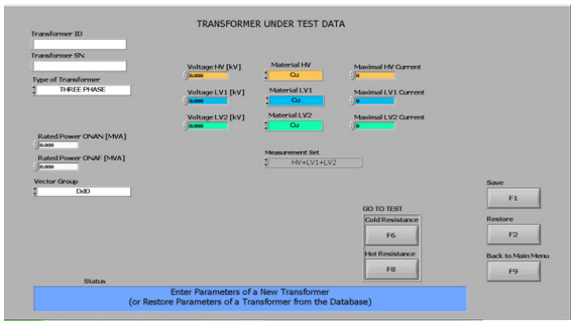
1. Systems Diagnostic menu



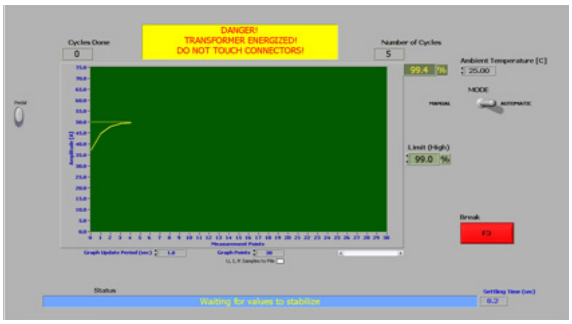
2. Main menu where measurements parameters can be changed, data paths can be established for saving the tests results, calibration data can be viewed or updated and GPIB communication of each instrument can be tested.



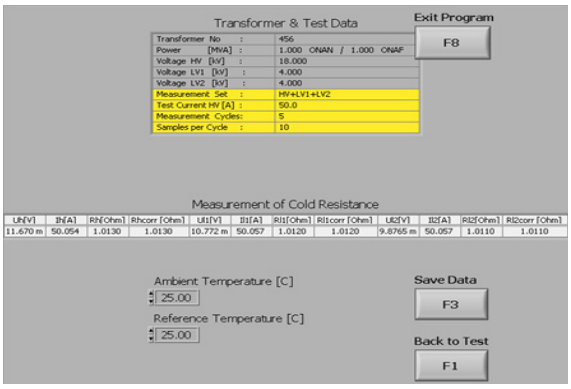
3. Test object menu where data on the transformer can be entered or recalled.



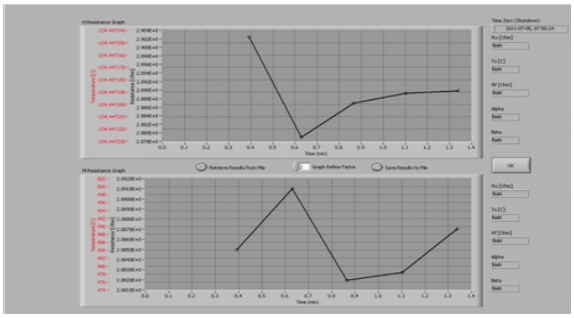
4. Cold Resistance measurement screen. Cold resistance measurements feature both cycle time and settletime. Measurements are updated every one second.



5. The Cold Resistance Table where upon completion of the cold resistance measurement the data is presented on the screen and then stored to file.



6. Hot resistance measurements are performed after the cold resistance measurements have been completed. Hot resistance measurements feature both cycle time and settletime with measurements being updated every one second. The data for the hot resistance measurement is stored to a data file for performing history analysis on the transformer. When the hot resistance measurement is completed both the resistance and temperature curves are displayed.



MODEL AWRMS™ 200

Rack Design:
The measuring units of the transformer test system are placed in a 19“ cabinet on wheels. This makes the AWRMS™ 200 easily movable. An industrial grade controller, monitor and keyboard are also located in the rack. An optional control desk is available if required.

Industry Preference:
In addition to the innovative technology, the AWRMS™ 200’s speed and accuracy account for the increased interest 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. Power supply (max: 100 VDC & 250 A), handle even the largest PTs and saturates them within the shortest time them within the shortest time.

Operating Efficiency:
A wide range of features specifically tailored for the testing of large PTs are accomplished through a 20 Channel Scanner. This ensures that all the temperature measurements are automated improving operator efficiency and eliminating human errors.

Safety:
Several safety circuits are built into the AWRMS™ 200 including:

1) Safety Foot Pedal.
2) Start Key Switch.
3) Start Button.
4) Magnetic Switch on the rear panel.
5) Heavy Duty Protection Circuit.
6) Warning light on top of the Rack.
7) Heavy Duty overvoltage protection at the Potential Terminals.
8) Emergency Stop Switch.
9) Software Warnings are shown on the screen.
    1) After Selecting Cold or Hot Resistance Measurements.
    2) After selecting OK and the measurement starts the message “Danger: Transformer Energized. Do Not Touch Connections” is displayed.
10) The Test Current and Voltage for the power supply are selected automatically via the program.

MODEL AWRMS™ 200

Cost Reduction:
The AWRMS™ 200 is a multi-parameter rack system. Its automated operation improves measurement efficiency and reduces testing cost. The system can very much reduce the maintenance and unexpected shutdown costs.

INPUT CONNECTIONS
Input connections are made at the rear of the rack including current leads, potential leads and temperature leads. Both the current and potential leads are self locking once installed.

Two handles are used to move the system about from one transformer to another making the AWRMS™ 200 very flexible and portable.

Current Cables:
Current Cables are size 4/0 and are colour coded red for positive and black for negative with locking connectors when inserted into the rear panel plugs.

Potential Cables:
Six (6) #6 cables are included with the system with locking connectors when inserted into the rear panel plugs.

Calibration & Verification:
Items that are available to Calibrate the AWRMS™ 200 include the MIL Standard Resistor models 9332 /0.0001, 0.001, 0.01, and 0.1Ω and Model 9331 10Ω. The system is supplied with a calibration report using a 100μΩ shunt at currents of 50, 100, 150 and 200 Amps.

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System Specifications: Rev 1

System Configuration

Source Power: 25 kW
Test Current: 0 to 250 A
Test Voltage: 0 to 100 V-DC

Resistance Measurement Range

Range	*Test Current*
20µΩ to 50µΩ	250A
50µΩ to 200µΩ	25A to 250A
200µΩ to 2mΩ	100A to 250A
2mΩ to 400mΩ	2.5A to 250A
400mΩ to 50Ω	Imx = 100/Rx

Accuracy: ± 0.1 %
Settletime: < 60 seconds
Winding Measured: Y-Wye, Δ-Delta, or Mixed, Single or Three Phase
Temperature Coefficient: < 5 PPM/°C

Temperature Measurement (RTDs/ PT100s), Thermocouples

Range: -100°C to 400°C
Accuracy: +/- 1°C

Environmental Conditions

Operating Temperature: 10 °C to 45 °C
Humidity Range: < 80 % r.h. non –condensing

Mains Supply (see Optional Items)

Voltage: 342/440 or 396 to 528 3-Phase
Current: 67 A
Frequency: 47 to 63 Hz

Controller:

Industrial Grade with IEEE488.2 Card
Monitor 433 mm (17”), Keyboard

Windows 7, 100G HD, MS Office

Weight and Dimension

Weight: 450 Kg (992 lbs)
Rack Size (D X W X H): 1003 X 592 X 1963 mm (39.5 X 23.3 X 77.3 in)
Warranty: 1 Year (Parts & Labor) (Optional 2 and 3 year Warranty)

Optional Items:

Second set of Current and Potential Cables: > 20m
Additional Temperature Channels: 20
Temperature Probes: RTDs, Thermocouples, and Thermistors
Extended Warranty
Available in 208/220 V-AC 1-Phase 110 Amps

Corporate Headquarters
Measurements International
PO Box 2359, 118 Commerce Drive
Prescott, Ontario, Canada K0E 1T0

Phone: (613) 925-5934
Fax: (613) 925-1195
Email: sales@mintl.com

Toll Free: 1-800-324-4988

Worldwide Offices

MI-USA
Phone: (407) 706-0328
Email: sales@mintl.com
Toll Free: 1-866-684-6393

MI-China
Phone: 86-10-64459890
Email: sales@mintl.com

MI-Europe
Phone: +(420) 731-440-663
Email: sales@mintl.com

MI-Japan
Phone: +(81) 72 39 64 660
Email: kaz@mijpn.com

MI-India
Phone: +(91) 98 10 134 932
Email: sales@MILLP.co.in

www.mintl.com