

# WRM-40

Winding Resistance Meter



**Vanguard Instruments Company**

[www.vanguard-instruments.com](http://www.vanguard-instruments.com)



# Accurately

resistance, motor winding resistance, or any low resistance. If the transformer winding temperature is entered, the WRM-40 can calculate the equivalent resistance value of the winding material (aluminum or copper) at any standard reference temperature. Also, a special test mode can run a test for up to 45 minutes while saving resistance readings at one-minute intervals. In addition to measuring the resistance value, the WRM-40 also checks the “make-before-break” tap-switching sequences of voltage regulators and load tap changers.

The WRM-40 can store test results in Flash EEPROM. Test results can be printed on the built-in 2.5-inch wide thermal printer or can be transferred to a PC via the RS-232C interface port.

The WRM-40 is furnished with three 50-foot test cables. Each test cable lead is terminated with a quick-disconnect test clip.

## **Built-in Safety Features**

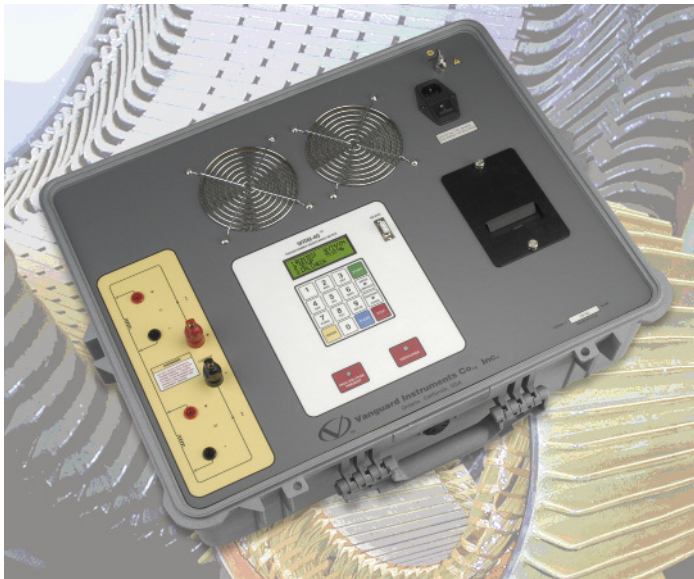
At the end of each test, the WRM-40 automatically dissipates the stored energy in the transformer. This discharge circuit will continue to work even if the supply voltage is lost. For added safety, the unit's power supply is thermally protected from over-load damage.

## **User Interface**

The WRM-40 features a back-lit LCD screen (20 characters by 4 lines) that is viewable in both bright sunlight and low-light levels. A rugged, alpha-numeric, membrane keypad is used to control the unit.

## **Internal Test Record Storage**

The WRM-40 can store 63 test records (up to 48 readings per test record) in Flash EEPROM. Test records can be retrieved and printed on the built-in thermal printer or can be transferred to a PC via the RS-232C interface port. A Windows® XP/Vista-based software application is provided with each WRM-40. This software can be used to retrieve test records from the WRM-40 and can also be used to export records in Microsoft® Excel format.



# WRM-40™

## **Fast and Accurate Measurements**

The WRM-40 is designed to accurately measure the winding resistance of highly inductive power transformers. The unit's dual resistance-reading input channels can measure two winding resistances simultaneously, and four-wire (Kelvin) connections provide high accuracy and require no lead compensation. The WRM-40 provides stable resistance readings of very large transformers by utilizing a 36Vdc power supply capable of outputting up to 40 Amperes. The resistance reading of a 500MVA transformer can be achieved in 5 minutes or less. The unit's power supply is cooled by four heavy-duty fans designed for continuous operation. For greater flexibility in the field, the WRM-40 comes with a built-in 2.5-inch wide thermal printer used for printing test reports.

Since the WRM-40 can accurately measure resistances ranging from 1 micro-ohm to 500 ohms, it can also be used to measure EHV circuit-breaker contact

## **SPECIFICATIONS**

<b>TYPE</b>	Portable transformer winding resistance meter
<b>PHYSICAL SPECIFICATIONS</b>	25"W x 8.5"H x 20"D (63.5 cm x 21.6 cm x 50 cm); Weight: 44 lbs (20 kg)
<b>INPUT POWER</b>	100 – 120 Vac or 200 – 240 Vac (factory pre-set), 50/60 Hz
<b>RESISTANCE READING RANGE</b>	1 micro-ohm – 500 ohms
<b>ACCURACY</b>	1 – 19,999 micro-ohms: $\pm 0.5\%$ reading, $\pm 1$ count; 20 – 999 milli-ohms: $\pm 1\%$ reading, $\pm 1$ count; 1 – 500 ohms: $\pm 1.5\%$ reading, $\pm 1$ count
<b>TEST VOLTAGE</b>	36 Vdc max
<b>TEST CURRENT RANGE</b>	Auto range, 40 Amperes max
<b>DISPLAY</b>	Back-lit LCD Screen (20 characters by 4 lines); viewable in bright sunlight and low-light levels
<b>PRINTER</b>	2.5-inch wide built-in thermal printer
<b>KEYPAD</b>	Rugged membrane keypad (10 alpha-numeric keys, 6 function keys)
<b>INTERNAL TEST RECORD STORAGE</b>	Stores 63 test records of 48 readings each
<b>COMPUTER INTERFACE</b>	One RS-232C (19,200 baud) port
<b>PC SOFTWARE</b>	Windows® XP/Vista-based software is included with purchase price
<b>SAFETY</b>	Designed to meet IEC61010 (1995), UL61010A-1, CSA-C22.2 standards
<b>ENVIRONMENT</b>	Operating: -10°C to 50°C (15°F to +122°F); Storage: -30°C to 70°C (-22°F to +158°F)
<b>CABLES</b>	Three 50-foot test cables, ground cable, power cord and cable bag
<b>OPTIONS</b>	Transportation case
<b>WARRANTY</b>	One year on parts and labor

Note: The above specifications are valid at nominal voltage and ambient temperature of +25°C (+77°F). Specifications are subject to change without notice.

# Lightweight Winding Resistance Meter

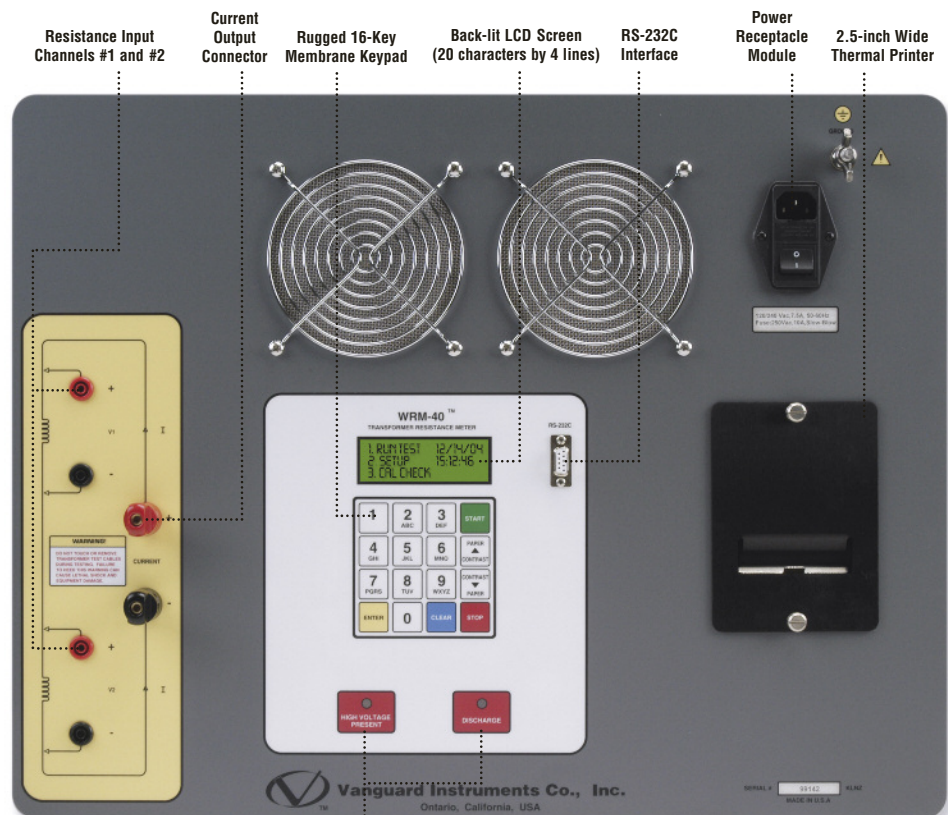
# Measure Winding Resistances of Highly Inductive Power Transformers

## ▼ Thermal Printer Output

TEST RESULTS	
DATE: 01/22/05	TIME: 06:43:40
COMPANY: VIC	
STATION: WSH	
CIRCUIT: BNK5	
MFR: EFACEC	
MODEL: C13968	
S/N: C13968	
KVA RATING: 138 13	
OPERATOR: AG	
EQUIVALENT RESISTANCE DATA	
MEAS TEMP $T_m = 16.5C$	61.7F
REF TEMP $T_s = 85.0C$	185.0F
COPPER WINDINGS, $T_k = 234.5C$	
$R_s = R_{meas} \times [(T_s + T_k) / (T_m + T_k)]$	
All temps for eqn are in deg C	
V1 & V2 TEST	
R1 = 502 MICRO-OHMS	
R1s = 639 MICRO-OHMS	
R2 = 506 MICRO-OHMS	
R2s = 644 MICRO-OHMS	
TAP/WINDING: _____	
DATE: 01/22/05	TIME: 06:43:40

## FEATURES

- Auto discharge circuit for operator safety
- Auto current ranging from 10 mA to 40 Amperes
- Digital resistance reading from 1 micro-ohm to 500 Ohms
- Calculates equivalent resistance value at reference temperature
- Stores 63 records (of 48 readings each)
- Built-in 2.5-inch wide thermal printer



## Ordering Information

WRM-40™ Winding Resistance Meter

### WRM-40™, Cable, Software

Part No: WRM-40

### WRM-40™ Shipping Case

Part No: WRM-40 Case

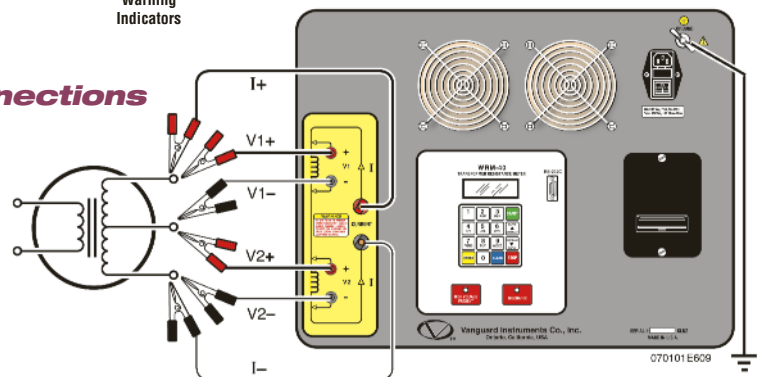
### 50-ft Test Cable

Part No: WRM Test Cable

### 2.5-inch Printer Paper

Part No: Paper TP3

## Connections



**Vanguard Instruments Company**  
Reliability Through Instrumentation

RVFeb09



### **Vanguard Instruments Company, Inc.**

Vanguard Instruments Co., (VIC), was founded in 1991. Currently, our 28,000 square-foot facility houses Administration, Design & Engineering, and Manufacturing operations. From its inception, VIC's vision was, and is to develop and manufacture innovative test equipment for use in testing substation EHV circuit breakers and other electrical apparatus.

The first VIC product was a computerized circuit-breaker analyzer, which was a resounding success. It became the forerunner of an entire series of circuit-breaker test equipment. Since its beginning, VIC's product line has expanded to include microcomputer-based, precision micro-ohmmeters, single and three-phase transformer winding turns-ratio testers, winding-resistance meters, transformer tap-changing controllers, megaohm resistance meters, and a variety of other electrical utility maintenance support products.

VIC's performance-oriented products are well suited for the utility industry. They are rugged, reliable, accurate, user friendly, and most are computer controlled. Computer control, with innovative programming, provides many automated testing functions. VIC's instruments eliminate tedious and time-consuming operations, while providing fast, complex, test-result calculations. Errors are reduced and the need to memorize long sequences of procedural steps is eliminated. Every VIC instrument is competitively priced and is covered by a liberal warranty.

**Vanguard products are available from:**



**Vanguard Instruments Company, Inc.**

1520 S. Hellman Ave. • Ontario, California 91761 USA • P 909-923-9390 • F 909-923-9391  
[www.vanguard-instruments.com](http://www.vanguard-instruments.com)