

# ATRM-20/3 ATRM-40/3

HIGHEST RESOLUTION AND ACCURACY  
WITH LOW COST



## 3-Phase Winding Resistance Meters

# ATRM-20/3 ATRM-40/3

Perform three phase test on a transformer without the need to switch cables.

Can provide individual Delta or Wye winding resistance values

Demagnetize transformer after test.


Selectable test current from 1A to 20A (ATRM-20/3) and 1A to 40A (ATRM-40/3).

Computer-control via RS-232C, USB, or bluetooth interface.

Equivalent resistance value at any temperature.

amperis

[www.amperis.com](http://www.amperis.com)

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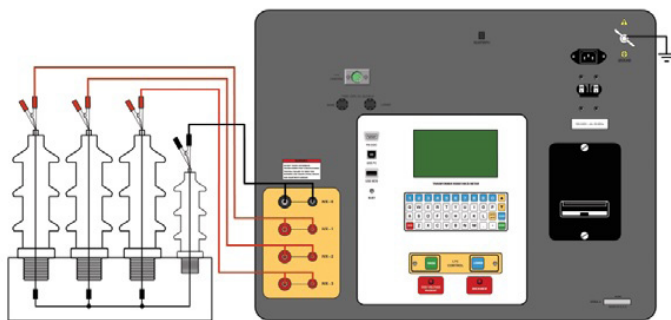
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The ATRM-20/3 and ATRM-40/3 are three phase transformer winding resistance meters that allow the user to connect all test cables to the transformer bushings. The unit will then measure the transformer resistance value for each of the phases without the need to disconnect and reconnect cables for each phase. The ATRM-20/3 and ATRM-40/3 can provide a fast and stable reading of very large transformers by utilizing a 60Vdc power supply. The ATRM-20/3 is capable of outputting a selectable test current from 1A to 20A while the ATRM-40/3's test current is selectable from 1A to 40A. Since both units can accurately measure resistance from 1 micro-ohm to 500 Ohms (up to 2000 Ohms for the ATRM-20/3), they can be used as micro-ohm meters to measure EHV circuit breaker contact resistance, or for any low resistance measuring application.

For a Delta transformer, the ATRM-20/3 and ATRM-40/3 can measure the phase resistance readings and provide the individual Delta winding resistance values. The ATRM-20/3 and ATRM-40/3 can also provide the individual winding resistance values for a Wye transformer without the neutral terminal. If the transformer winding resistance temperature is available at the time of testing, the ATRM-20/3 and ATRM-40/3 can calculate the equivalent resistance value at any temperature value. This useful feature can be used to compare the field readings against the factory test resistance values. The ATRM-20/3 and ATRM-40/3 can perform a special test to collect data automatically for up to 90 minutes (at 60-second sampling intervals) or 45 minutes (at 30 second sampling intervals). The test data is recorded with a time stamp. All test results can be printed on the unit's built-in 2.5" wide thermal printer. Test record header information including the Company, substation name, transformer information, and operator information can also be entered using the rugged, 44-key "QWERTY"-style membrane keypad. The ATRM-20/3 and ATRM-40/3 can automatically demagnetize the inductive device under test, eliminating the manual task of demagnetizing the transformer core after a resistance test. The ATRM-20/3 and ATRM-40/3 also has a "make-before break" test mode that can be used to test the Load Tap Changer (LTC) or Voltage Regulator contact test sequence. The ATRM-20/3 and ATRM-40/3 produces a "Dynamic-Resistance" graph of the LTC or Voltage regulator contact under operation. An opened contact can be detected visually from this resistance chart.

The ATRM's built-in LTC/Voltage regulator can be used to conveniently change the LTC/voltage regulator tap position from the ATRM-20/3 and ATRM-40/3 front panel.

## ATRM-20/3 and ATRM-40/3 Connections



### Computer Interface

The ATRM-20/3 and ATRM-40/3 can be connected to a PC via the unit's RS-232C, USB, or Bluetooth interface. A PC can be used to control the ATRM-20/3 and ATRM-40/3 to perform transformer resistance tests. Test records (stored in the ATRM-20/3 and ATRM-40/3 or a USB Flash drive) can also be retrieved, reviewed, and printed. Test records are automatically exported to PDF, Excel, and XML formats.

### User Interface

The ATRM-20/3 and ATRM-40/3 features a back-lit graphic LCD screen (128 x 64 pixels) that is clearly visible in both bright sunlight and low light levels. A 44-key "QWERTY"-style membrane keypad is used to enter test information and operate the unit.

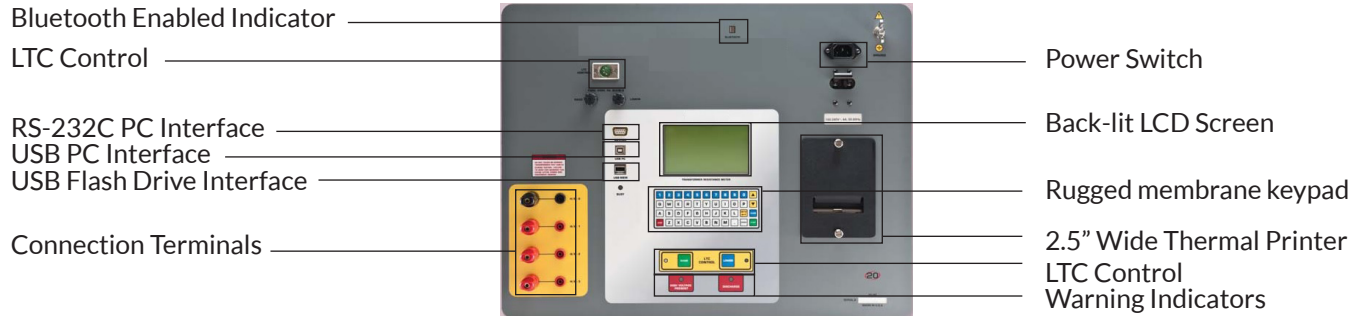
### Safety Features

The ATRM-20/3 and ATRM-40/3 automatically dissipates the energy stored in the transformer at the end of each test. The discharge circuit will continue to work even if the ATRM-20/3 and ATRM-40/3 power supply is lost.

### Test Record Storage

The ATRM-20/3 and ATRM-40/3 can store up to 256 static test records (111 tests per record) and 120 dynamic test records internally. For external test record storage, the ATRM-20/3 and ATRM-40/3 features a USB Flash drive interface port. Up to 999 test records can be stored on a connected USB Flash Drive.

## ATRM-20/3 and ATRM-40/3 Controls



### ATRM-20/3 and ATRM-40/3 Specifications

|                                 |  |
|---------------------------------|--|
| <b>Type</b>                     | Portable transformer winding resistance meter  |
| <b>Physical specifications</b>  | 21"W x 17"H x 9" D (53 cm x 43 cm x 24 cm); Weight: 35 lbs (15.8 kg)   |
| <b>Operating voltage</b>        | 100 - 240 Vac, 50/60 Hz  |
| <b>Resistance reading range</b> | <b>ATRM-20:</b> 1 micro-ohm - 2000 ohms; <b>ATRM-40:</b> 1 micro-ohm - 500 ohms  |
| <b>Accuracy</b>                 | 1 - 19,999 micro-ohms: ±0.5% reading, ±1 count;<br>20 - 999 milli-ohms: ±1% reading, ±1 count;<br>1 - 2000 ohms: ±1.5% reading, ±1 count |
| <b>Test current</b>             | ATRM-20: 1A - 20A in 1A increments; ATRM-40: 1A - 40A in 1A increments   |
| <b>Test voltage</b>             | 60Vdc charging, 18V DC max during measurement  |
| <b>Resistance channels</b>      | 4 input channels for measuring resistance  |
| <b>Display</b>                  | Back-lit LCD screen (128 x 64 pixels); viewable in bright sunlight and low light conditions  |
| <b>Printer</b>                  | Built-in 2.5-inch wide thermal printer   |
| <b>Internal data storage</b>    | 256 static test records (each can contain up to 111 readings) and 120 dynamic test records   |
| <b>External data storage</b>    | Up to 999 test records on external USB Flash drive   |
| <b>Computer interface</b>       | RS-232C, USB, and Bluetooth  |
| <b>Safety</b>                   | Designed to meet UL 61010A-1 and CAN/CSA C22.2 No. 1010.1-92 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>Humidity</b>                 | 90% RH @ 40°C (104°F) non-condensing   |
| <b>Altitude</b>                 | 2,000 m (6,562 ft) to full safety specifications   |
| <b>Cables</b>                   | Four 50-foot test cables, one LTC control cable, one ground cable, one power cord, one USB   |
| <b>Optional accessories</b>     | Transportation case  |
| <b>Warranty</b>                 | 1 year on parts and labor  |

### ATRM-20(40)/3 Thermal Printer Report

| TEST RESULTS  |                         |
|---|-------------------------|
| DATE:   | 05/11/12 TIME: 09:27:56 |
| COMPANY:  | COMPANY 2               |
| STATION:  | STN 3                   |
| CIRCUIT:  | CIR 4                   |
| PRF:  | MAN 5                   |
| MODEL:  | MOD 6                   |
| SN:   | SN 7                    |
| KVM RTG:  | KVA 8                   |
| OPERATOR:   | OPER 9                  |
| Y (no Ncut) TEST  |                         |
| EQUIVALENT RESISTANCE DATA                              |                         |
| REFS TEMP:  | Ta = 25.0C 77.0F        |
| REF TEMP:   | Ta = 75.0C 167.0F       |
| ALUMINUM WINDINGS:                                      | Tk = 225.0C             |
| R <sub>s</sub> = R <sub>meas</sub> × C(Ta+Tk)/(Ta+Tk) 2 |                         |
| All temps for eqn are in deg C                          |                         |
| PHASE A   |                         |
| H <sub>1</sub> X1 - H <sub>2</sub> X3                   |                         |
| R <sub>s</sub> = 3.0176 OHMS                            |                         |
| R <sub>w</sub> = 1.9984 OHMS                            |                         |
| R <sub>ms</sub> = 2.3981 OHMS                           |                         |
| I = 0.993 AMPS  |                         |
| PHASE B   |                         |
| H <sub>2</sub> X2 - H <sub>1</sub> X3                   |                         |
| R <sub>s</sub> = 2.4980 OHMS                            |                         |
| R <sub>w</sub> = 2.9976 OHMS                            |                         |
| I = 0.994 AMPS  |                         |
| PHASE C   |                         |
| H <sub>2</sub> X2 - H <sub>1</sub> X1                   |                         |
| R <sub>s</sub> = 1.5189 OHMS                            |                         |
| R <sub>w</sub> = 1.8227 OHMS                            |                         |
| I = 0.995 AMPS  |                         |

| TEST RESULTS  |                         |
|---|-------------------------|
| DATE:   | 05/11/12 TIME: 09:44:24 |
| COMPANY:  | COMPANY 2               |
| STATION:  | STN 3                   |
| CIRCUIT:  | CIR 4                   |
| PRF:  | MAN 5                   |
| MODEL:  | MOD 6                   |
| SN:   | SN 7                    |
| KVM RTG:  | KVA 8                   |
| OPERATOR:   | OPER 9                  |
| DELTA TEST  |                         |
| EQUIVALENT RESISTANCE DATA                              |                         |
| REFS TEMP:  | Ta = 25.0C 77.0F        |
| REF TEMP:   | Ta = 75.0C 167.0F       |
| ALUMINUM WINDINGS:                                      | Tk = 225.0C             |
| R <sub>s</sub> = R <sub>meas</sub> × C(Ta+Tk)/(Ta+Tk) 2 |                         |
| All temps for eqn are in deg C                          |                         |
| PHASE A   |                         |
| H <sub>1</sub> X1 - H <sub>2</sub> X3                   |                         |
| R <sub>s</sub> = 2.4007 OHMS                            |                         |
| R <sub>w</sub> = 2.8808 OHMS                            |                         |
| R <sub>ms</sub> = 3.9895 OHMS                           |                         |
| R <sub>ms</sub> = 4.7874 OHMS                           |                         |
| I = 0.994 AMPS  |                         |
| PHASE B   |                         |
| H <sub>2</sub> X2 - H <sub>1</sub> X1                   |                         |
| R <sub>s</sub> = 2.1127 OHMS                            |                         |
| R <sub>w</sub> = 2.5352 OHMS                            |                         |
| R <sub>ms</sub> = 3.0278 OHMS                           |                         |
| R <sub>ms</sub> = 3.6334 OHMS                           |                         |
| I = 0.995 AMPS  |                         |
| PHASE C   |                         |
| H <sub>2</sub> X2 - H <sub>1</sub> X2                   |                         |
| R <sub>s</sub> = 2.1018 OHMS                            |                         |
| R <sub>w</sub> = 2.5221 OHMS                            |                         |
| R <sub>ms</sub> = 3.0004 OHMS                           |                         |
| R <sub>ms</sub> = 3.6005 OHMS                           |                         |
| I = 0.995 AMPS  |                         |

Phase A measurement resistance  
 Calculated Phase A resistance at reference temp.  
 Phase A-C measurement resistance  
 Calculated Phase B winding resistance  
 Calculated Phase B winding resistance at reference temp.

Sample test results showing individual winding resistance values for a Delta transformer. The ATRM-20(40)/3 can also calculate the phase resistance and individual winding resistance values at a given reference

Sample test results showing individual winding resistance values for a Wye transformer with no accessible neutral. The TRM-203/403 can also calculate the phase resistance and individual winding resistance values at a given reference temperature (Rs and Rws, respectively)

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