# *Automatic Transformer Ratiometer*

MODEL ATRM-200

**FEATURES**:

- Automatic measurement of ratio & phase angle deviation
- Digital presentation of ratio & phase angle deviation
- Suitable for operation in energized switchyard conditions
- Ratio range of 0.2 – 199.99 to 1 in three ranges
- Four terminal measurements to reduce errors due to winding and lead resistance
- Internal three - phase lead switching circuitry (manual)
- Automatic polarity indication
- Manual selection of ratio-phase angle deviation functions
- Isolated excitation & Isolated measurement
- Excitation voltage of 36 volts @ line frequency
- High accuracy and resolution
- Light weight and portable

**DESCRIPTION:**

The Eltel ATRM-200 Automatic Transformer Ratiometer measures the transformation ratio of transformers in a ratiometric circuit. As the measurement is conducted at low flux density, this measurement is equivalent to the turns ratio of the transformer. Besides measuring turns ratio, ATRM-200 also measures phase angle deviation between the tested windings. As a perfect transformer should show no phase difference between the input and output, the measured phase angle deviation is an indicator of possible shorted turns or poor core quality.

The instrument excites the High Voltage winding (HV) of the test transformer and measures the output of the Low Voltage winding (LV) in a ratiometric circuit and displays the result on a 4½ digit LCD indicator.

The ATRM-200 uses 36 volts at line frequency to excite the HV winding. The measurement is not instantaneous but is conducted over a period that is equal to a whole number of line frequency periods, thereby helps to eliminate line frequency interference. The ATRM-200 is useful for all transformer except for small CTs that may saturate when 36 volts are applied.

## SPECIFICATIONS

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|---|---|---|
| ❖ Ratio Range | : | 0.2 - 1.9999, 19.999, 199.99 to 1, manually selected |
| ❖ Ratio Accuracy | : | ± 0.1 % ± 2 counts |
| ❖ Phase Angle Deviation | : | ± 20 degrees |
| ❖ Phase Resolution | : | ± 0.01 degrees |
| ❖ Excitation | : | 36 volts @ line frequency |
| ❖ Power | : | 230 volts ± 10%, 50Hz OR 110 volts ± 10%, 60 Hz , 60VA max. |
| ❖ Weight | : | Approximately 8 Kgs. |
| ❖ Size | : | Approximately 200mm x 200mm x 350mm |

## PRINCIPLE OF OPERATION

The ATRM-200 excites the High Voltage winding of the test transformer with a signal of 36V, line frequency. The output of the Low Voltage winding is measured in a ratiometric circuit with respect to its magnitude and phase. The result of the measurement is displayed on a 4½ digit LCD indicator.

In addition to the ratio, the polarity of the winding is indicated by LED indicator. The polarity indicator comes 'ON' when the connections between the instrument and the transformer under test are not properly made or the phase angle difference between the primary and the secondary of the transformer is greater than $10^{O}$. The selection of Ratio or Phase Angle Deviation indication is accomplished manually. A LED indication is also provided for 'under range' and 'over range'.

The Ratio and Phase Angle Deviation measurements are conducted over a number of power frequency cycles in an effort to reduce or eliminate power frequency interference. The reading is updated every 64 cycles of the power frequency, thereby updating the display every 1.28 seconds at 50 Hz or 1.04 seconds at 60 Hz. The excitation source is isolated, as are the two measuring inputs. This features allows one to measure auto transformers or transformers that may have a common (ground) connection between the primary and secondary winding.

The ATRM-200 has a built-in three phase rotary switch to assist the operator and eliminate the time consuming task of climbing to the top of power transformers to change the leads. Measurement continues to be performed in single phase method and the front panel switch allows the selection of any phase combination.

## OPTIONAL ACCESSORIES

- ❖ Range Extender 10 : 1
- ❖ CVT Range Extension 40 : 1


**OTHERS PRODUCTS**

■ Manual & Automatic Transformer Winding Resistance & On Load Tap Changer Test Sets. ■ Automatic 12KV & 5 KV Capacitance & Tan Delta Test Sets. ■ Digital Micro Ohm Meters with built in 100A. DC Source. ■ Complete CT, VT & CTVT Test Systems. ■ Automatic Tan Delta & Resistivity Test Sets for Transformer Oil. ■ Relaying Current Transformer Analyser. ■ Transformer Loss Measurement System.



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