

# THREE PHASE FULLY AUTOMATIC TRANSFORMER RATIO METER



ATR PLUS

The Etel ATRM Plus is a microprocessor based, three phase, fully automatic Transformer Ratio Meter. This is designed to conduct turns ratio tests on Large Power & Distribution Transformers both in the shop floor and in charged switchyard conditions. Besides measuring the turn's ratio, the ATRM Plus also measures the phase angle deviation between the tested windings. A perfect test object should show no phase angle difference between primary and secondary; the measured phase angle deviation is an indication of possible shorted turns or poor core quality. The Test Set excites the High Voltage (HV) winding and measures the output of the Low Voltage (LV) winding in a ratio metric circuit and displays the results on the LCD display.

## FEATURES

- ARM 9 micro processor controlled, fully Automatic measurement.
- Wide selection of Excitation Voltages of 10V, 40V, 100V, 230V & 250V from front panel.
- Very high measurement Accuracy of 0.05%.
- In-built pre-test sequence to prevent wrong lead connections to test specimen. Error message displayed.
- 4V and 10V Excitation voltage provided for CT measurements.
- Ratio range of up to 5000; direct display of measured ratio. No conversions required.
- Automatic Jumper selection as per the vector diagram of Transformer.
- Automatic testing of all 3 phases in 3 phase transformers without manual intervention.
- Separate icon for single phase and three phase tests provided.
- Displays % deviation from a nominal ratio.
- Maximum Ratio Deviation can be set as per the testing standard / requirement. Deviation displayed as " Pass " in Green when measured value is within the entered or theoretical value limits and displayed as "Failed" in Red when it exceeds the entered value.
- External storage facility using pen drive. Internal storage up to 10000 readings.
- Automatic result storing option provided at the end of the test .
- Touch screen 7" Color TFT display with backlighting with resolution of 800 X 480.
- Tap changer facility.
- Computer interface using RS-232 or USB printer interface..
- Windows Interface software provided for data transfer. Includes Auto store and CT test options.
- Four terminal measurements to reduce errors due to lead resistance.
- Auto print and storage facility.
- Fast measurements.

## TEST VOLTAGES:

A wide selection of test voltages of 10V, 40V, 100V, 230V & 250V are provided. Test Voltage can be selected from the touch screen display. This provides the user with flexibility to select the test voltage based on his specimen ratings. It has been proven that better ratio measurement accuracy is achieved by exciting Large Power Transformer windings with higher test voltages. Thus voltages of 230V and 250V are provided to test large specimens.

A very low test voltage of 4V and 10V are also given for CT measurements. Depending on the CT design and ratings, the user can also select other higher test voltages for CT testing- provided they do not saturate the CT core.

## TRUE 4 TERMINAL MEASUREMENT:

The leads that are supplied allow for a true four terminal measurement which eliminates errors caused by lead length and errors due to circulating currents.

## LEAD SWITCHING:

The ATRM Plus has a Automatic built-in three phase switching provision. This assists the operator and eliminates the time consuming task of climbing to the top of power transformers to change the test leads. Leads to all three phases can be connected prior to beginning the measurement. The test is performed in a single phase method and the results for each phase are displayed on the front panel TFT display.

## IEEE VECTOR GROUP SELECTION:

All standard IEEE vector group selections are already pre-fed in the ATRM Plus. The operator has to select the primary and the secondary vector, choose the test voltage and commence the testing.

## POLARITY CHECK:

Reverse polarity message is displayed on the screen when the connections between the instrument and the transformer under test are not properly made.

### PHASE ANGLE DEVIATION:

Etel Industries are the pioneers in manufacturing Ratio meters with phase angle deviation. The phase angle difference between primary and secondary voltage gives clues to whether the power transformer under test has shorted turns or whether the windings has an unequal number of turns connected in parallel. All these factors change the phase angle between primary & secondary voltage. The phase angle deviation is also important in evaluating CTs for shorted turns.

### EXCITATION CURRENT:

Excitation current measurement facility is provided. This will help in detecting a shorted turn on a parallel winding of power transformer if readings from previous measurements are available.

### TAP CHANGER FACILITY:

The ATRM Plus has the facility to change taps using the built in tap changer circuitry. Thus eliminating the need to physically change the taps on the transformer.

### WINDOWS SOFTWARE:

An Interface software is also provided with the ATRM Plus to transfer the stored results to a PC or Laptop. The files can be transferred and stored in PDF or Excel format.

### INTERFACES:

For connecting to the PC or Laptop, the RS 232 OR USB Interface is available. This can be used to either remotely control the Test Set OR to transfer stored results to the computer.

A USB Interface is also provided to connect a 80 column dot matrix Printer to the Test Set. Direct Printing of test results is possible from the Test Set to the Printer without the need for a PC or software. A USB port is also provided to transfer stored results to a Pen drive. The ATRM Plus uses Military standard high quality Amphenol connectors for output connection.

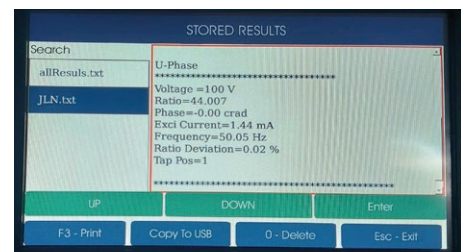
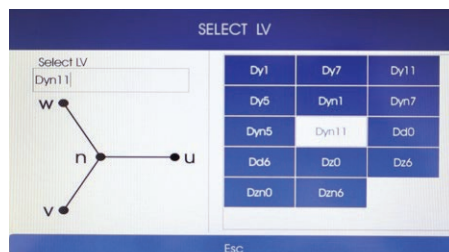
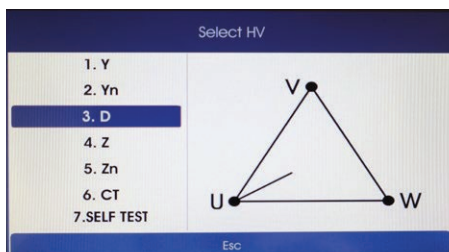
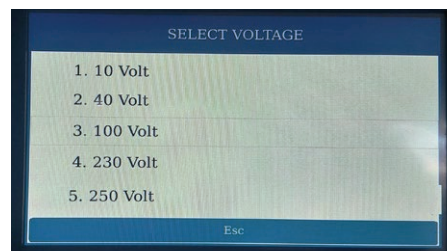
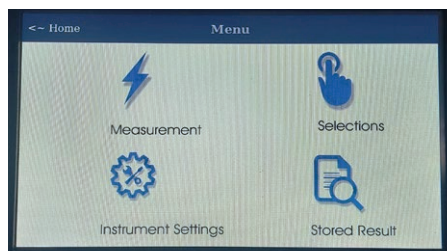
## SPECIFICATIONS

<b>Circuit</b>	: Transformer-Arm Bridge
<b>Power</b>	: 230V $\pm$ 10%, 50 Hz, or 115 $\pm$ 10%, 60Hz
<b>Test Voltage</b>	: Wide selection of Excitation Voltages of 10V, 40V, 100V, 230V & 250V from front panel; 4V and 10V Excitation voltage provided for CT measurements
<b>Phase measurement Range</b>	: 0 to 180°
<b>Excitation Current range</b>	: 1A @ $\leq$ 40V, 0.5A @ 100V, 0.2A @ 230V & 250V
<b>Ratio Range</b>	: 0.8:1 to 5000
<b>Ratio Resolution</b>	: 5 ½ digit.
<b>Dimensions</b>	: 485mm x 380mm x 205mm (LxBxH)
<b>Weight</b>	: ATRM plus – Approx 12 kgs (net weight) 15m cable – Approx 9 kgs (netweight)
<b>Environmental</b>	: -10° to 60° C (Operating); -20° C to 70° C (storage); Ambient to 90% RH
<b>Standard Accessories</b>	: - 15m cables set with clips (200mm opening) - Ground cable 15m - USB PC interface cable 2m - USB Printer Interface cable 2m - Spare fuses - Operation Manual - Interface Software in pen drive - OLTC cable - Power cord

# SPECIFICATIONS

## RATIO ACCURACY

RATIO RANGES	ACCURACY SPECIFICATION					RATIO RESOLUTION
	10V	40V	100V	230V	250V	
0.8 — 5	0.05%	0.05%	0.05%	0.05%	0.05%	5 Digit
5 — 100	0.08%	0.06%	0.05%	0.05%	0.05%	5 Digit
101 — 1000	NA	NA	0.1%	0.05%	0.05%	5 Digit
1001 — 2000	NA	NA	0.1%	0.08%	0.08%	5 Digit
2001 — 5000	NA	NA	NA	0.1%	0.1%	5 Digit



## OTHER PRODUCTS

- Automatic Transformer Ratio Meters.
- Digital Micro Ohm Meter with built in 100A DC Source.
- Manual & Automatic Transformer Winding Resistance & On Load Tap Changer Test Sets.
- Automatic 12kV & 5kV Capacitance & Tan Delta Test Sets.
- Automatic CT/ VT Test Sets & Systems.
- Automatic Tan Delta & Resistivity Test Sets for Transformer Oil.

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Eltel Industries, established in 1983, is a market leader in the development and manufacturing of test instruments for electrical power industries and utilities.

**Eltel Industries – Calibration Laboratory (including on-site calibrations) is NABL - ACCREDITED in electro-technical discipline in accordance to ISO/ IEC:17025/2017**

An ISO 9001-2015 Certified Company

(Specifications subject to change without notice)