SCOPE

TTRM 301
TTRM 302

Transformer Turns Ratio Meter

The most advanced Automatic Transformer Turns Ratio Meter ...TTRM

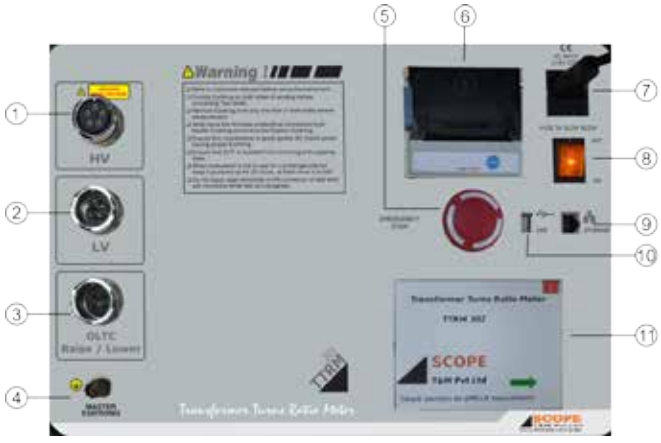
The Product

TTRM 301 / 302 Transformer Turns Ratio Meter

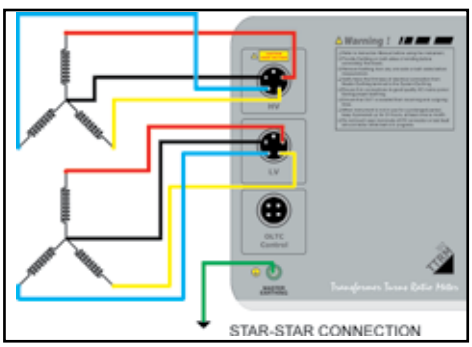
SCOPE introduces state of the art precision three phase Transformer Turns Ratio Meter (TTRM) designed for field testing as well as factory testing of power transformers, instrument transformers and distribution transformers of all types. TTRM 301 measures only truns ratio where as TTRM 302 along with turns ratio, measures ratio deviation, phase angle deviation, magnetizing current and detects tap-position of single as well as three phase transformers in charged switchyard condition. TTRM 302 has facility to automatically detect vector group of all majority configurations available. The range of AC voltage selection offers high accuracy in measurement.
Both the instrument have in-built TFT display with touch screen and thermal printer. The user friendly, simple instrument makes the testing more easy. With the touch keypad it is possible to enter required DUT information. The ratio results of all the phases are displayed in tabular form with % error. Internal non-volatile memory gives the provision of storing test results. Further data can be downloaded to PC or copied to memory stick through USB port provided.
The CTrans-TTRM software, gives the flexibility to download the stored results to PC and do the further analysis and report generation.

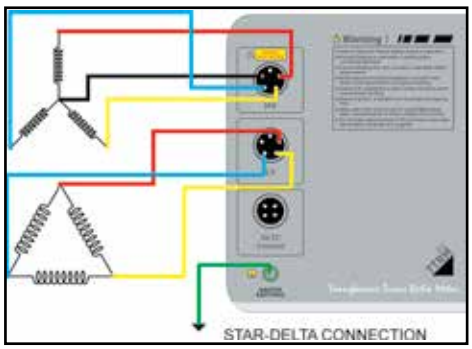
The Measurement

- **Turns Ratio :** The performance of a transformer mainly depends upon accuracy of specific turns or voltage ratio of transformer. So transformer ratio test is an essential test of transformer. The voltage should be applied only in the high voltage winding in order to avoid unsafe voltage. In service, insulation around windings can become damaged or deteriorated from number of causes including spikes, surges, faults, contamination and transport. Insulation damage can short the turns resulting in lower number of turns. Ultimately the voltage will deviate from the voltage mentioned on nameplate of transformer. So turns ratio is maintenance tool which will indicate the condition of insulation between windings of transformer. TTRM measures the Turns ratio and directly displays in tabular form.
- **Phase angle deviation:** The phase difference between high voltage and low voltage windings of single phase is measured. Any deviation in phase indicates the fault in the transformer winding. The instrument has wide range of phase angle deviation measurement with highest accuracy.
- **Magnetizing current:** Magnetizing current test of transformer is performed to locate defects in the magnetic core structure, shifting of windings, failure in turn to turn insulation or problem in tap changers. These conditions change the effective reluctance of the magnetic circuit, thus affecting the current required to establish flux in the core. If the measured exciting current value is higher than the value measured during factory test, there is likelihood of a fault in the winding which needs further analysis.
- **Vector Group:** In three phase transformer, it is essential to carry out a vector group test of transformer. Proper vector grouping in a transformer is an essential criterion for parallel operation of transformers.



1. HV Cable
2. LV Cable
3. OLTC Control Cable
4. Master Earthing
5. Emergency Stop
6. Thermal Printer
7. AC Input Socket
8. On-Off Switch
9. Ethernet Port
10. USB Port
11. TFT Display


STAR-STAR CONNECTION


STAR-DELTA CONNECTION

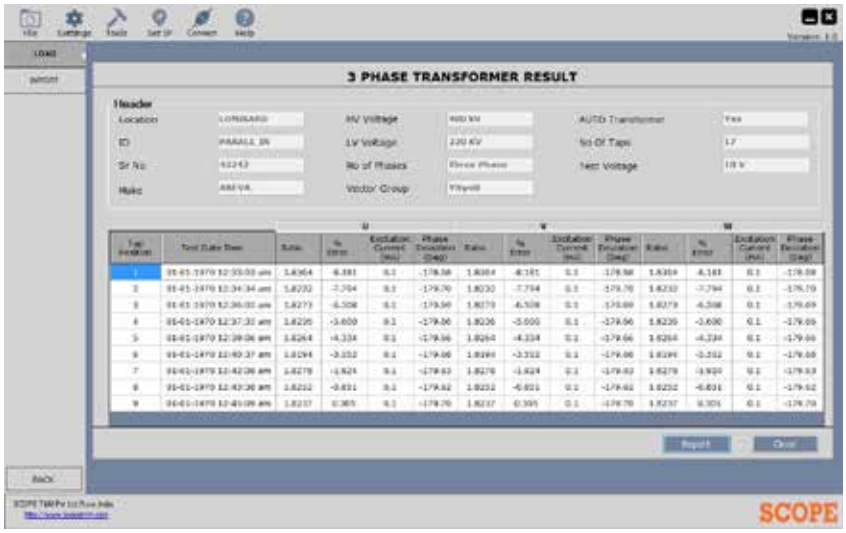
Special Features

- Different voltage ranges provided for more accurate results
- 5.7" TFT display with touch screen and simple menus to operate TTRM.
- Facility to configure transformer ID and details
- Automatic OLTC operation for tap change
- Date and time stamping to results.
- In-build memory to store the test results.
- Thermal printer to take quick print out for record.
- Ethernet port for PC interface to transfer records to PC Software.
- Mass storage device (USB 2.0) interface for copying records in pen drive.
- Lightweight , portable instrument household in rugged moulded case

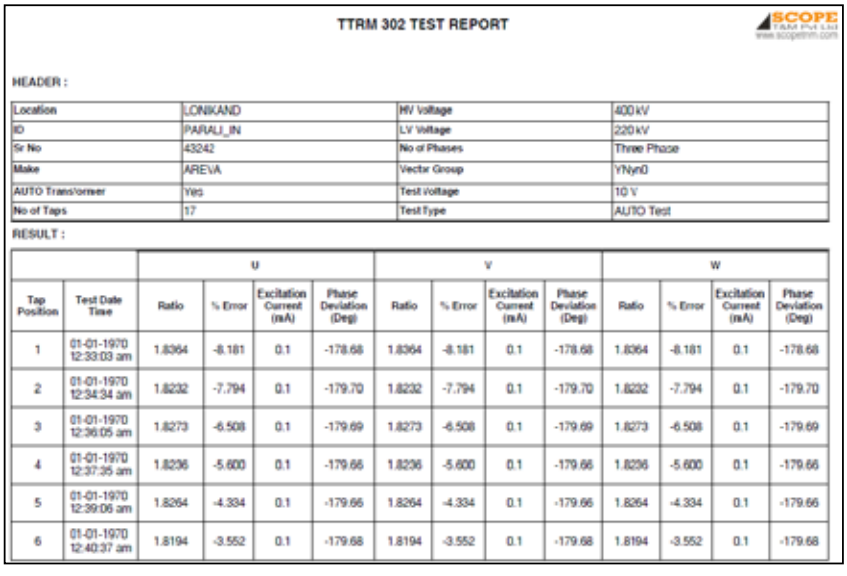
Software Features

CTrans TTRM

This is windows based software enables uploading of Transformer IDs and its details to instrument & downloading of test results from instrument to PC. Instrument is connected to PC using Ethernet cable. So once the software is installed on PC, instrument can be directly connected without wasting any time. Library of various Transformer IDs is generated in software. Once you create the Transformer ID all result taken in future on that Transformer will be listed down under same ID created in software. The report generation for the tests taken is also possible. This report can be exported to various formats like PDF, Microsoft Excel, Microsoft Word, HTML, etc. and also can be printed.



TTRM Test Report



TTRM 302 TEST REPORT

HEADER :

Location	LONIKAND	HV Voltage	400 kV
ID	PARALI_IN	LV Voltage	220 kV
Sr No	43242	No of Phases	Three Phase
Make	AREVA	Vector Group	YNyn0
AUTO Transformer	Yes	Test Voltage	10 V
No of Taps	17	Test Type	AUTO Test

RESULT :

		U				V				W			
Tap Position	Test Date Time	Ratio	% Error	Excitation Current (mA)	Phase Deviation (Deg)	Ratio	% Error	Excitation Current (mA)	Phase Deviation (Deg)	Ratio	% Error	Excitation Current (mA)	Phase Deviation (Deg)
1	01-01-1970 12:33:03 am	1.8364	-8.181	0.1	-178.68	1.8364	-8.181	0.1	-178.68	1.8364	-8.181	0.1	-178.68
2	01-01-1970 12:34:34 am	1.8232	-7.794	0.1	-179.70	1.8232	-7.794	0.1	-179.70	1.8232	-7.794	0.1	-179.70
3	01-01-1970 12:36:05 am	1.8273	-6.508	0.1	-179.69	1.8273	-6.508	0.1	-179.69	1.8273	-6.508	0.1	-179.69
4	01-01-1970 12:37:35 am	1.8236	-5.600	0.1	-179.66	1.8236	-5.600	0.1	-179.66	1.8236	-5.600	0.1	-179.66
5	01-01-1970 12:39:06 am	1.8264	-4.334	0.1	-179.66	1.8264	-4.334	0.1	-179.66	1.8264	-4.334	0.1	-179.66
6	01-01-1970 12:40:37 am	1.8194	-3.552	0.1	-179.68	1.8194	-3.552	0.1	-179.68	1.8194	-3.552	0.1	-179.68

Specifications

	Parameter	Test Voltage	Range	Resolution	Accuracy
1	Ratio	10 V	0.8000 – 9.9999	0.0001	0.05 %
			10.000 – 99.999	0.001	0.05 %
			100.00 – 999.99	0.01	0.05 %
			1000.0 – 1500.0	0.1	0.05 %
			1500.1 – 2000.0	0.1	0.1 %
			2000.1 – 4000.0	0.1	0.2%
		40 V	0.8000 – 9.9999	0.0001	0.05 %
			10.000 – 99.999	0.001	0.05 %
			100.00 – 999.99	0.01	0.05 %
			1000.0 – 4000.0	0.1	0.05 %
			4000.1 – 9999.9	0.1	0.25 %
			10000 - 13000	1	0.25 %
		100 V	0.8000 – 9.9999	0.0001	0.03 %
			10.000 – 99.999	0.001	0.03 %
			100.00 – 999.99	0.01	0.05 %
			1000.0 – 4000.0	0.1	0.05 %
			4000.1 – 9999.9	0.1	0.15 %
			10000 – 13000	1	0.15 %
			13001 - 20000	1	0.20 %
2	Excitation Current (Only in TTRM 302).	10 V	2000 mA	0.1 mA	± 1 mA
		40 V	500 mA	0.1 mA	± 1 mA
		100 V	200 mA	0.1 mA	± 1 mA
3	Phase Deviation (Only in TTRM 302).	10V / 40V / 100 V	± 180 Degree	0.01 Degree	± 0.05 Degree

Parameters	TTRM 301	TTRM 302
No of channels	Three HV channels and three LV channels	
Test Voltages	10V, 40V and 100V AC selectable voltages	
Measurements	Ratio, Ratio error	Ratio, Ratio error, Phase angle deviation, Excitation current, vector group
OLTC Control	Raise and Lower control to operate OLTC	
Test Results Display	(TFT) display, Thermal Printer.	
Test Leads	Suitable to test EHV Transformers	
Printer	Inbuilt Thermal Printer	
Paper	Thermal, 58 mm wide roll form	
Memory	Inbuilt memory, can store 1000 records, with date and time stamping. USB port to copy record in pen drive	
Power	(110V ± 15%) / (60Hz ± 10%) OR (230V ± 15%) / (50Hz ± 10%), 75VA.	
Communication Port	Ethernet port.	
Housing	Fitted in moulded case	
Environment	20°C to 55°C 95%RH (non-condensing) Electrical noise normally found in charged EHV switchyards	
Dimensions	435 X 315X 175 mm. (Max.)	
Weight	10 Kg Approx	

Benefits

- Measurement of ratio of all the phases in single test with % error
- Automatic operation of OLTC and ratio calculation at all the taps and tabular result printing
- Complete analysis of transformer with phase angle deviation, magnetising current measurement and tap position detection (Only in TTRM 302).
- Automatic vector group detection of generally available three phase transformers (Only in TTRM 302).
- Simple and easy to use due to TFT display and touch screen.
- Advanced microprocessor offers latest features to user.
- Result storage, downloading to PC ensures proper data maintenance.

Ordering Information

Description	Std Qty
Standard Accessories	
HV Cable, 15m long	1 No
LV Cable, 15m long	1 No
OLTC Command cable, 10m long	1 No
Master Earthing Cable, 7m long	1 No
Ethernet Cable, 2m long	1 No
Thermal Printer Paper roll	1No
Soft carrying bag for instrument and test lead set	1 No each
Mains cable, 3m long	1No
Operation cum instruction manual	1 No
Factory test & Calibration Certificate	1 No
Warranty Certificate	1 No
Communication & Data Downloading Software in CD media	1 No
Optional Accessories	
HV Extension Cable, 10m long	1 No
LV Extension Cable, 10m long	1 No

Generation, Transmission,
Distribution, Industry ...

... there is **SCOPE** *always !*

Simple solutions for difficult measurements®

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