SCOPE

TTRM 302

Transformer
Turns Ratio Meter

The advanced Automatic Transformer Turns Ratio Meter ...TTRM

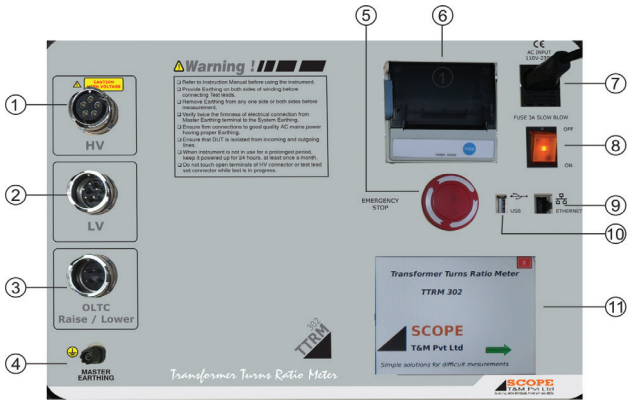
The Product

SCOPE's 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 302 measures turns ratio, ratio deviation, phase angle deviation, magnetizing current, magnetic balance test (optional) and detects tap-position of single as well as three phase transformers in charged switchyard condition up to 765kV. TTRM 302 has facility of automatically detecting vector group of all majority configurations available in field. The range of AC voltage selection offers high accuracy in measurement.

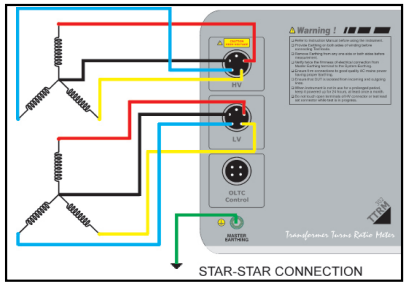
The instrument have in-built TFT display with touch-screen and thermal printer. The user friendly, simple instrument makes the testing easy. With the touch keypad it is possible to enter required DUT information. The ratio results of all the phases are displayed in tabular form with % error. Internal non-volatile memory gives the provision of storing test results. Further, data can be downloaded to PC or copied to a 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.

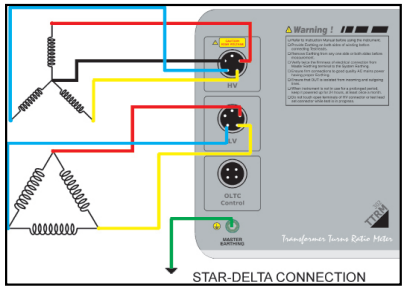
The Measurement

- **Turns Ratio:** The performance of a transformer mainly depends upon accuracy of specific turns or voltage ratio of transformer. So ratio test is an essential test for transformer. The voltage should be applied only in the high voltage winding in order to avoid unsafe voltage at the measurement terminals. Insulation around windings can get deteriorated or damaged over time due to various causes including electrical stress, surges, faults, contamination etc. Insulation damage can create inter-turn short resulting in lower number of turns. Ultimately the voltage will deviate from the voltage mentioned on nameplate of transformer. So TTRM is the maintenance tool which will indicate the condition of insulation between windings of transformer. TTRM measures the Turns ratio of all phases/taps and directly displays in tabular form.
- **Phase angle deviation:** 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.
- **Magnetic Balance** (optional)**:** Magnetic balance test assess core assembly condition, flux distribution within the transformer and identify magnetic imbalance due to Magnetic core structure, shifting or de-shaping of windings, wrong interleaving joints in windings.



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





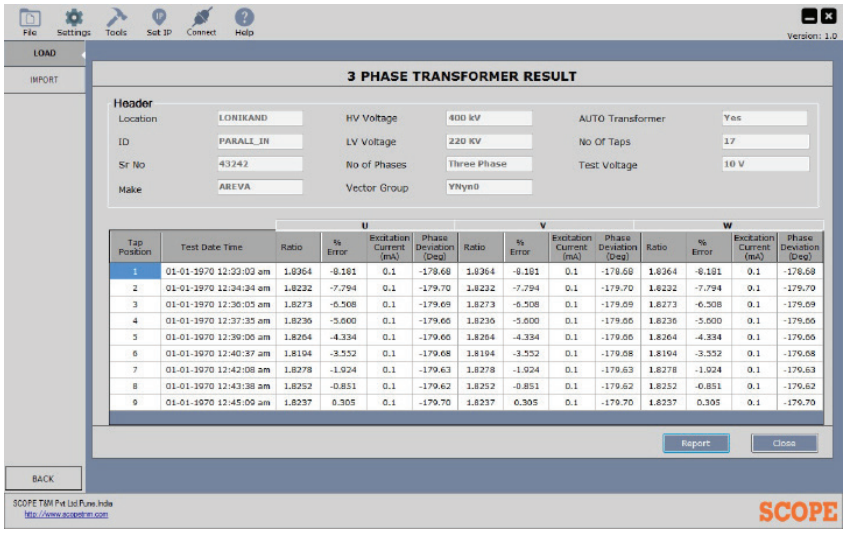
Special Features

- Selectable voltage ranges provided with accurate results
- 5.7" TFT touch-screen display and simple menus for operation
- Facility to enter transformer ID and details
- Automatic OLTC operation for tap change
- Date and time stamping of results
- In-built memory to store test results
- In-built thermal printer to take quick print out of test results
- Ethernet port for PC interface to transfer records to CTrans-TTRM Software
- Mass storage device (USB 2.0) interface for copying records in pen drive
- Lightweight, portable instrument house-hold in a rugged moulded case

Software Features

CTrans TTRM

CTrans TTRM is a Windows based software which enables uploading of Transformer IDs and its details to instrument & downloading of test results from instrument to PC. The instrument is connected to PC using Ethernet cable. The software is installed on PC, instrument can be directly connected with-out 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, MS Excel, MS Word, HTML, etc. and also can be printed.



TTRM Test Report

TTRM 302 TEST REPORT

SCOPE T&M Pvt Ltd www.scopetnm.com

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

Sr no.	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	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	10V / 40V / 100 V	± 180 Degree	0.01 Degree	± 0.05 Degree

Parameters	TTRM 302
No. of channels	Three HV channels and Three LV channels
Test Voltages	10V, 40V and 100V AC selectable
Measurements	Ratio, Ratio Error, Phase Angle Deviation, Excitation Current, Vector Group and Magnetic Balance (Optional)
OLTC Control	Raise and Lower control to operate OLTC
Test Results Display	5.7" touch-screen (TFT) display, thermal printer
Test Leads	Suitable to test EHV Transformers
Printer	Inbuilt thermal printer, 58mm wide
Memory	Up to 5000 records inbuilt memory, with date and time stamping
Power	110V ± 15% or 230V ± 15%, 50Hz / 60Hz ± 10%, 75VA
Communication Port	Ethernet port for PC Communication, USB port for data downloading to pen-drive
Housing	IP 65 rated moulded case
Operating Environment	-20°C to +55°C, 95%RH (non-condensing)
Storage Environment	-40°C to +60°C, 95%RH (non-condensing)
Dimensions	435 X 315X 175 mm. (Approx)
Instrument Weight	10Kg Approx

Benefits

- Automatic vector group detection facility
- Measurement of ratio of all the phases in single test with % Ratio error
- Automatic operation of OLTC and ratio calculation at all the taps and tabular result
- Complete analysis of transformer with phase angle deviation, magnetising current measurement and tap position detection
- Simple and easy operation through TFT touch-screen display
- Advanced microprocessor offers latest features to user
- Result storage, downloading to PC ensures proper data maintenance

Standard Accessories

Description	Std Qty
HV Cable, 15 m long	1 Set
LV Cable, 15 m long	1 Set
OLTC command cable, 10m long	1 No
Master earthing cable, 7m long	1 No
Mains power supply cable, 3m long	1No
Ethernet cable, 2m long	1 No
Thermal printer paper roll	1No
Soft carrying bag for instrument and test lead set	1 No
Operation cum instruction manual	1 No
Factory test & Calibration certificate	1 No
Warranty certificate	1 No
Communication and data downloading software	
Optional Accessories	
HV extension cable, 10m long	1 No
LV extension cable, 10m long	1 No

Ordering Code

Example: TTRM 302	**N**	**F**	**F**	**F**	**F**	**N**	**F**	**F**	**R**	**R**	**I**	**N**	#
TTRM 302		**F**	**F**	**F**	**F**		**F**	**F**					

N	**None ***		
1	Magnetic Balance Test		
F	Reserved		
F	Reserved		
F	Reserved		
F	Reserved		
N	**None ***		
Z	Customised		
F	Reserved		
F	Reserved		
		Customised	Z
		None *	N
		Universal Plug	U
		Indian Plug *	I
		110V ± 15%, 50/60Hz AC Input	Q
		230V ± 15%, 50/60Hz AC Input *	R
		Customised Length of Test Lead Set	Z
		25m Test Lead Set	E
		15m Test Lead Set *	R

Note: *- Standard feature/accessory
#- TTRM 302 (ordering code : NFFFFNFFRRIN) means turns ratio meter with, 15m test lead set, 230V ±15%, 50/60Hz AC input, Indian plug

Generation, Transmission,
Distribution, Industry ...

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

Simple solutions for difficult measurements®

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