Tettex INSTRUMENTS

TTR 2795

Fully automated three phase Transformer Turns Ratio Meter

On-site testing of turns ratio is an important basic measurement for power transformer diagnosis.
It helps to detect faulty transformer windings as well as defective tap changer positions. The simple ratio of turns or voltage and the related ratio error is not sufficient to detect all possible failures of a power transformer winding. The excitation current and the phase angle between primary and secondary windings give additional information about the winding condition. The TTR 2795 provides all these measurements in one compact instrument.

Transformer Turns Ratio Meter TTR 2795 is the next generation of the very successful Tettex transformer turns ratio meter line. The result of our close collaboration with worldwide TTR users and industry specialists in current and voltage transformers is this advanced instrument with its unbeaten performance. The TTR 2795 measures turns ratio with the highest accuracy in the industry and has one of the largest turns ratio ranges commercially available.

This advanced instrument automatically recognizes winding connections and vector group numbers of transformer windings. Just connect the measuring cables and press the start button and get the test results.

For an easy and fast detection of faulty tap positions, the measured turns ratios vs. tap changer position is displayed graphically.

The TTR 2795 provides a wide ratio range, which allows the user to determine the no load accuracy of CT's and PT's.

In addition, the selectable test voltages of 100V, 40V, 10V and 1V avoid any saturation effects on current transformers.

FEATURES AND BENEFITS

Fully automated measurement of **turns ratio, voltage ratio, phase displacement and excitation current**.

Highest measurement accuracy in the industry of up to 0.03% makes the 2795 the perfect tool for preventive maintenance measurement.

Automatic winding connection identification AWCI (patent pending) and **automatic vector group detection** supports the quick and easy operation.

Safety connection control feature proofs test setup before applying test voltage to avoid any damage of personnel, test equipment and instrument.

Build-in printer for quick test report generation and total prevention of data loss.

User friendly self-explaining interface with one rotary-push-button for easy access to the menu structure.

Large graphic display shows all data at a glance and displays tap changer results in a clear graphic diagram.

Lightweight, compact and rugged design for use in harsh environments. Closed case is IP65 waterproof, open case is splash proof.

Remote control software to operate the unit from a laptop PC and for easy gathering exchanging and analyzing of measurement data.

APPLICATIONS

Turns Ratio, Voltage Ratio, Phase Displacement and Excitation Current measurements according to ANSI, IEC and AS standards on

- Power and Distribution Transformers
- Current and Voltage Instrument Transformers

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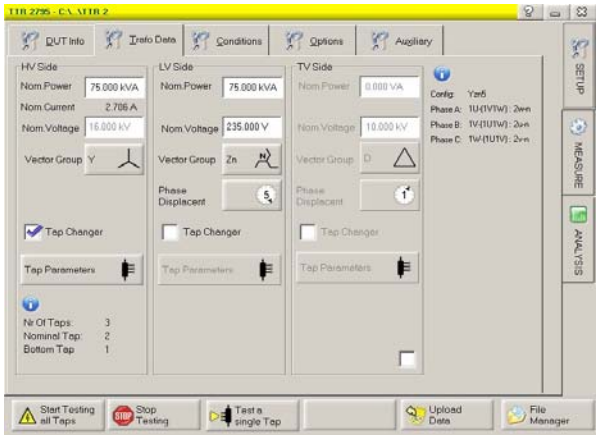
APPLICATION SOFTWARE APSW2795

The supplied user-friendly Windows™ software guides the operator through the measurements and helps to create experts analysis and provides easy report generating. The software can be used on any PC or laptop with a serial RS-232 interface.

Measurements can be performed in rough environments by only using the rugged instrument and the measured data can later be uploaded to a PC or laptop.

In moderate environments the instrument can be remote controlled by a laptop or PC, in order to make optimal use of the advanced user interface and it's many features. Device under Test (DUT) information data can be entered in a very convenient way. Stored data can be used and data sets can be compared.

In order to organize data properly, the transformer data from the boilerplate as well as the data from the operator can be used as input for the test setup.



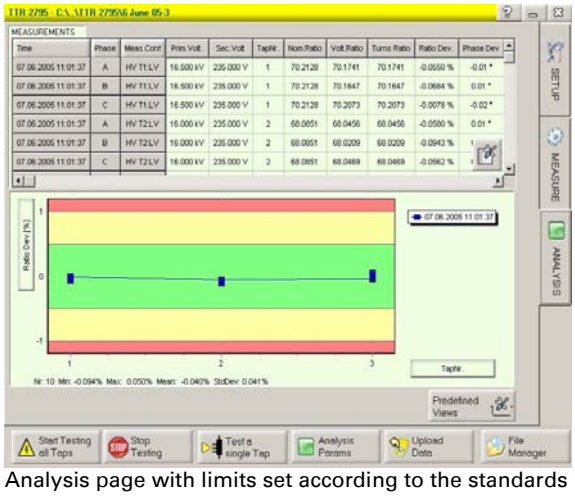
Setup page to select vector group and tap-changer. Additionally tertiary windings, vector group type, phase displacement and tap changer can be defined and edited in the test setup.

On the measure page, the voltage-ratio, ratio-deviation and phase deviation are shown in a large display.
In the middle part the actual test settings (tap, test voltage and winding under test) can be selected by pressing a button.

In the bottom part the already measured data (history) is clearly displayed and recorded in a table format.

Measure page where the measuring values are displayed

From the measured data together with the transformer data from the boilerplate as well as the data from the operator an accurate report can be generated. This report contains all the required data of the tested object to further analyze and compare the measurements with former measurements.
In order to properly display the measured data, limits can be set to give a clear overview of the values, with green (pass), yellow (alert) and red (failed) areas to help the engineer in decision making. These limits can be used according to the IEC/IEEE standards or adjusted to own expertise.



Analysis page with limits set according to the standards

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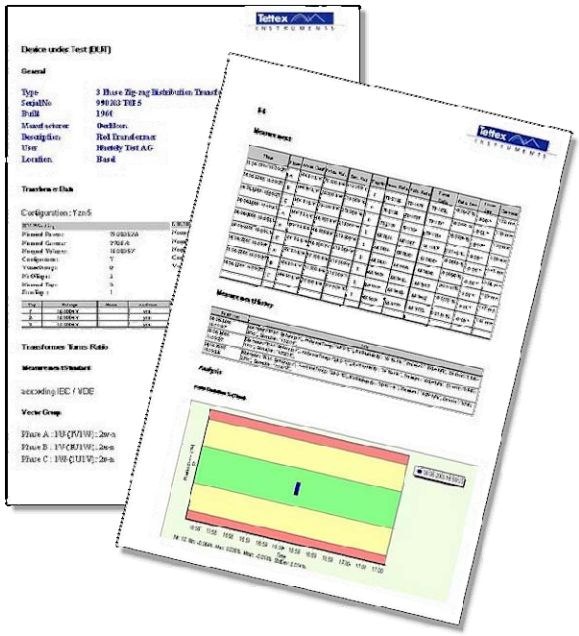

REPORTING

Full reports are automatically generated in XML-, HTML- and CSV- format.

The graphs itself are also separately stored in jpg-format to make the easy handling complete.

The XML- and HTML-files can be opened in e.g. Internet Explorer and from there directly printed or copied into a Microsoft Word document.

To further expand the powerful analysis functionality of the APSW2795 the automatic generated CSV-file can be directly opened in Microsoft EXCEL where customer specific data processing and calculations are possible.

Example of XML-report printout

TECHNICAL SPECIFICATIONS

General

Excitation voltage	1 V, 10 V, 40 V and 100 V; automatic or manual selectable
Excitation current	max. 1 A (10 mA at 1 V)
Display	5.2" dot matrix LCD 240x128 module with backlight
Memory	Stores up to 100 complete test results/test setups
Printer	Thermal strip printer, paper width 58mm
Interfaces	Computer: RS 232C, 19200 baud, 9 pole Tap changer: 3 pole contact in/out (potential free)
Operating temperature	- 10°C* ... 55°C * - 10°C typical, - 5°C guaranteed
Storage temperature	- 20°C ... 70°C
Mains	95 .. 240 V AC, 50/60 Hz, max. 1.3 A
Dimension (L x W x D)	41 cm x 31 cm x 17 cm (16" x 12.2" x 7")
Weight	8.8 kg (19 lbs) excl. cables

Measurement Ranges and Accuracy

	Accuracy 1			
Ratio	**@ 1 V**	**@ 10 V**	**@ 40 V**	**@ 100 V**
0.8 .. 100	± 0.10 %	± 0.05 %	± 0.05 %	± 0.03%
101 .. 1000	± 0.20 %	± 0.05 %	± 0.05 %	± 0.05 %
1001 .. 1500	n/a	± 0.05 %	± 0.05 %	± 0.05 %
1501 .. 2000	n/a	± 0.10 %	± 0.05 %	± 0.05 %
2001 .. 4000	n/a	± 0.20 %	± 0.05 %	± 0.05 %
4001 .. 13000	n/a	n/a	± 0.25 %	± 0.15 %
13001 .. 20000	n/a	n/a	n/a	± 0.20 %

Excitation Current	**Range**	**Resolution**	**Accuracy**
Range and Accuracy	0 ... 1 A	0.1 mA	± 1 mA

Phase Angle	**Range**	**Resolution**	**Accuracy**
Range and Accuracy	± 180°	0.01°	± 0.05°

1 @ Excitation voltage, values valid after a warmup-time of 30 min

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SCOPE OF SUPPLY

TTR 2795 instrument in shell case, cable bag, two 3-phase cable sets (5 m spider and two sets of clamps), two 3-phase extension cable sets (10 m), remote control, data storage and report generation software, remote cable, mains cable, manual, calibration certificate.

288x TTR instrument built-into MIDAS 288x, operated via the touch screen display. Complete cable set included.

ACCESSORIES & OPTIONS

▪ **2795/V**
Verification box 2795V is used to check the correct functionality of the Ratio Meter and its connected measuring cables. Different ratios (1, 10, 100, 1000) can be selected. Measuring cables have to be connected following the description on the front respectively the color code. The verification measurements shall be within an overall accuracy of ±1% of the nominal ratio. If the displayed values exceed this limit the unit has to be sent back to the manufacturer for recalibration respectively repair.

▪ **2795/TAP**
External Tap Test Start Switch 2795TAP is used for convenient tap changer testing.
After the TTR has measured a tap, it stands by waiting for the tap changer to be moved to the next tap position and then continue the measurement, by pressing “CONTINUE” on the unit. The tap changer operation box on power transformers is normally not in the same place where the TTR 2795 is placed. The external tap switch cable allows the operator to perform the measurement by controlling the TTR 2795 from a remote position (normally at the tap changer box of the transformer).

▪ **2795/10**
Additional two 3-phase extension cables, 10 m.
Used to extend the reach of the basic connection set by another 10 m.
The final length results in total 25 m (10+10+5) with this additional cable set.

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