

TWR250B

Up to 250 V AC · 25 A DC



Six AC and DC tests on a three-phase transformer with a single connection

TWR250B

Turns ratio and winding resistance analyzer

amperis

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General description



Front view of the TWR250B, with 10.1" touch screen.

Complete three-phase testing with one connection

TWR250B is a three-phase, fully automatic analyzer designed for transformers. A single instrument covers winding resistance, the on-load tap changer dynamic test (DVtest), demagnetization, turns ratio, phase shift and excitation current. All 6 to 8 transformer terminals -3 or 4 on the HV side and 3 or 4 on the LV side- are connected at once, which significantly reduces testing time in the field, especially on large transformers. It also measures the winding resistance of any inductive object, such as motors and generators, and of purely resistive objects.

Winding resistance up to 25 A DC

The instrument generates a true, ripple-free DC current of up to 25 A. Each transformer configuration has its own measurement algorithm, optimized for fast stabilization of the results, and both the current injection and the discharge of the energy stored in the magnetic circuit are regulated automatically.

Turns ratio under IEC 60076-1

The ratio is determined by applying voltage across the high-voltage windings and accurately measuring the voltage across the unloaded windings. It tests single-phase and three-phase transformers, with or without taps. Once the vector diagram is selected, the instrument runs the specific test for each connection -delta-wye, wye-delta, delta-delta, wye-wye, delta-zigzag, etc.- without changing the test leads.

Nameplate deviation and interference filtering

The operator enters the nameplate voltages and the instrument automatically calculates the ratio deviation, removing any manual calculation error. Very efficient filtering, based on proprietary hardware and software solutions, cancels the electrostatic and electromagnetic interference of HV electric fields.

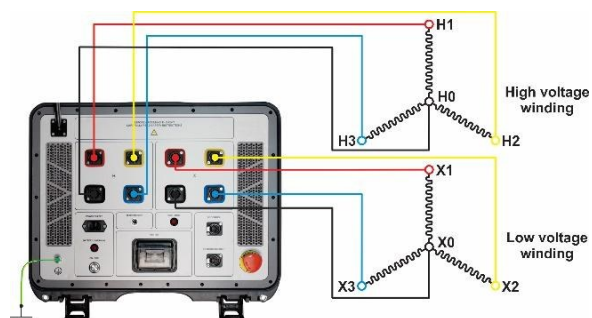


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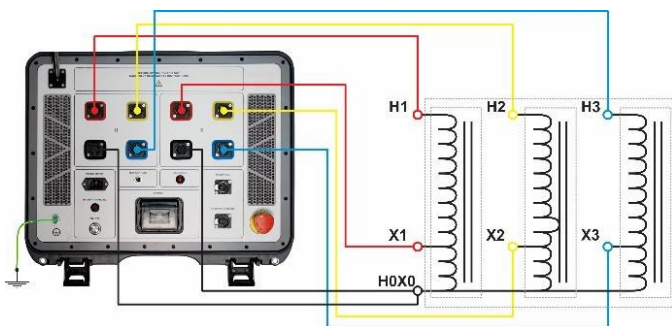
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Connection to the test object



Connection to a three-phase transformer.



Connection to a three-phase autotransformer.

Three-phase transformer

Using three or four H cables and three or four X cables, all bushings on the HV and LV sides are connected at once.

Three-phase autotransformer

Four H cables and four X cables connect all HV and LV bushings at once. Both neutral cables, H and X, are connected to the neutral bushing of the autotransformer.

Single-phase transformers and autotransformers

Although a three-phase instrument, TWR250B tests single-phase transformers using two H cables and two X cables. On single-phase autotransformers, the H and X neutrals are connected to the neutral bushing.

Current transformers

The instrument measures winding resistance, demagnetizes and verifies the turns ratio and polarity of current transformers. As the secondary has the larger number of turns, the H cables go to the secondary winding and the X cables to the primary; when there are no primary terminals, the X cables are slid through the CT core and short-circuited.

Benefits and features



TWR250B connection panel (top view).

Internal battery

The built-in battery allows on-site testing even when no external power supply is available; the instrument also runs on mains power.

Test voltage up to 250 V AC

The highest test voltage, 250 V AC, gives accurate turns ratio and magnetic balance measurements on large power transformers and autotransformers in generation and transmission.

Test current up to 25 A DC

With 25 A DC, winding resistance is measured quickly and accurately on the largest power transformers.

Resistance of all six windings in a single test

With all three HV and LV phases connected, the instrument injects current simultaneously through the HV and LV windings mounted on the same core limb: the core saturates sooner and the results stabilize quickly.

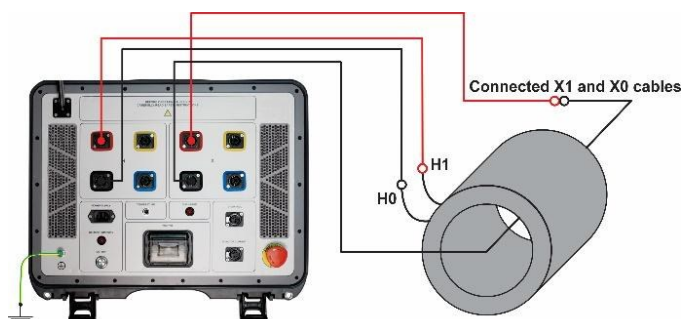
Automatic vector group detection

The vector group of three-phase transformers and autotransformers is identified automatically.

Core demagnetization

After a DC test, or when a transformer is taken out of service, residual flux may remain in the core. The instrument removes it with a controlled DC current of alternating polarity and decreasing magnitude down to zero, following a proprietary program.

Tap changer, memory and software



Connection to an unmounted current transformer.

Tap changer control and multi-position testing

The built-in control unit operates the on-load tap changer remotely, so a single operator completes the test very quickly. The instrument drives the whole process -measurement and tap change- automatically across multiple tap changer positions.

Touch screen, memory, printer and USB

The 10.1" graphical touch screen makes test preparation, execution and analysis easy: templates are prepared in the office, and in the field a few touches are enough. The 32 GB internal SD card stores tens of thousands of results and templates; the standard 58 mm thermal printer prints results right after the test or later, and the integrated USB flash drive exports them for analysis.

PC software

The Windows-based PC software is included in the purchase price and all updates are free of charge. It downloads the results from the instrument and presents them numerically and graphically; results export directly to Excel, and customized reports can be edited, saved in several formats, including PDF, and printed.

Applications

- Winding resistance and demagnetization.
- Turns ratio, nameplate deviation, excitation current and phase angle.
- Automatic vector group detection.

TWR250B – TECHNICAL SPECIFICATIONS

Mains power supply	90-264 V AC, 50/60 Hz; connection according to IEC/EN 60320-1, UL 498 and CSA 22.2
Battery	Li-ion, 14.4 V, 6.8 Ah, rechargeable
AC source	Test voltage from 1 V to 250 V
DC source	Test current from 5 mA to 25 A; test voltage up to 50 V
Turns ratio	Range 0.8-50,000; 5-digit resolution
Excitation current	Range 0-2 A
Phase angle	Range 0-360°; resolution 0.01°
Winding resistance	Range 0.1 $\mu\Omega$ -100 k Ω
Tap changer dynamic test (DVtest)	Resolution 1 ms
AC current measurement channel	Resolution 1 ms
Current clamp	Ranges 30/300 A; DC to 20 kHz (-3 dB); resolution $\pm 50/\pm 100$ mA; accuracy $\pm 1\%$ of reading
Temperature	-50 °C to +180 °C; Pt100 class B thermometer; resolution 0.1 °C
Display	10.1" graphical touch screen
Interface	Ethernet and USB
Internal memory	32 GB SD card
Printer	Built-in thermal printer, 58 mm paper; operating from -20 °C to +70 °C
Environmental conditions	Operating from -20 °C to +60 °C; storage and transport from -40 °C to +70 °C; relative humidity 0-95% non-condensing
Dimensions (W × H × D)	503 × 193 × 406 mm
Weight	11.0 kg
Standards	Installation/overvoltage category II; pollution degree 2; safety LVD 2014/35/EU, EN 61010-1:2010; EMC 2014/30/EU, EN 61326-1:2013 (CE conform)
Warranty	3 years

Specifications valid at +25 °C with standard accessories. Subject to change without notice.



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TWR250B – ACCESSORIES

Instrument article number: TWR250B-N-03

Included with the instrument	PC software, USB cable, Ethernet cable, 5 m tap changer control cable, mains power cable, ground (PE) cable, debug adapter and plastic transport case
H and X winding test lead sets, 4 × 10 m, with TTA clamps	Standard - HC-10-4FNCWC / XC-10-4FNCWC
Current clamp 30/300 A, powered from the instrument, with 5 m extension	Standard - CACL-0300-06
Cable plastic case, large size	Standard - CABLE-CAS-03
H and X winding test lead sets, 4 × 5 m, with TTA clamps	Optional - HC-05-4FNCWC / XC-05-4FNCWC
H and X winding test lead sets, 4 × 15 m, with TTA clamps	Optional - HC-15-4FNCWC / XC-15-4FNCWC
H and X winding test lead sets, 4 × 20 m, with TTA clamps	Optional - HC-20-4FNCWC / XC-20-4FNCWC
Temperature sensor 1 × 50 mm with 5, 10, 15 or 20 m cable	Optional - TEMP1-050-05 / -10 / -15 / -20
Test shunt 1 mΩ (150 A / 150 mV)	Optional - SHUNT-150-MK
Cable plastic cases: small, medium, medium with wheels and large with wheels	Optional - CABLE-CAS-01 / CABLE-CAS-02 / CABLE-CAS-W2 / CABLE-CAS-W3
Thermal paper roll, 58 mm	Optional - PRINT-058-RO
TRTC verification calibrator	Optional - TRTC-05-4800
H and X winding test lead sets, 4 × 1 m, with banana plugs	Optional - HC-01-4LNCBP / XC-01-4LNCBP
Cable bag	Optional - CABLE-BAG-00

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