Handheld Turns Ratio & Winding Resistance Tester TWR-H

- Unique handheld instrument on the market
- Performs 3 different tests – turns ratio, winding resistance, and demagnetization
- Single-phase test voltage up to 40 V AC
- Two DC current sources
- Test current up to 2 A DC for transformer HV side
- Test current up to 10 A DC for transformer LV side
- Extremely lightweight – only 1.4 kg / 3.1 lbs
- Battery-powered

Description

TWR-H is a handheld, battery operated, fully automatic test set specially designed for turns ratio, phase shift, excitation current and winding resistance measurements of transformers. It can also perform demagnetization of these transformers.

Transformer turns ratio is determined by applying AC voltage across high voltage winding, accurately measuring AC voltage across the corresponding unloaded transformer winding, and then displaying the ratio of these voltages.

User can enter a transformer's nameplate voltages, so that turns ratio deviation can be calculated. This feature eliminates any error otherwise caused by an operator's manual calculation. TWR-H compares measured turns ratio with the nameplate ratio and prints out the % of error for each test.

Transformer winding resistance is determined by injecting DC current through a winding, accurately measuring DC voltage across the winding, and then calculating resistance as the ratio of voltage and current.

The device generates true DC ripple-free currents. Both the injection of the current and the discharge of energy from transformer magnetic circuit are automatically regulated.

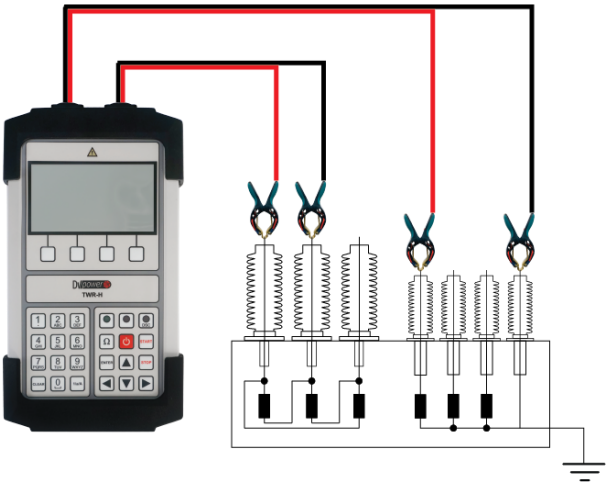
Application

The list of instrument application includes:

- Winding resistance measurement
- Turns ratio measurement
- Turns ratio deviation calculation
- Excitation current measurement
- Phase angle measurement
- Demagnetization

Connecting TWR-H to Test Object

Using two sets of cables, TWR-H can be can be connected to one phase at transformer HV side, and one phase at transformer LV side, simultaneously. Connecting to both sides is necessary for turns ratio measurement. For winding resistance measurement, TWR-H can be connected to either transformer HV side or LV side, or to both of them in case when HV and LV winding resistances are going to be measured simultaneously.



Connecting TWR-H to a three-phase distribution transformer

Benefits and Features

Two Output DC Sources

A common issue when testing winding resistance of distribution transformers is the selection of test current. Distribution transformers have high turns ratio, and therefore high difference between rated HV and LV currents. Testing HV and LV winding simultaneously with the same current source can be challenging – test current must be less than or equal to 10% of the HV rated current, which is very often too low for LV winding. For this reason, TWR-H has two output DC sources – one for transformer HV side, and the other for transformer LV side. This way, transformer HV and LV windings can be tested simultaneously using different test currents.

Multiple Tests

Built-in AC and two output DC sources enable performing multiple tests on a same transformer – winding resistance, demagnetization, turns ratio, excitation current, and phase angle – with a single cable and test setup.

Internal Battery

TWR-H is powered by internal, user-replaceable, rechargeable Li-Ion battery. A full day of testing can be performed with fully charged battery. TWR-H can also be operated while connected to mains power supply.

Memory

TWR-H has 100 transformer records. Up to 15 winding resistance and 15 turns ratio results can be stored in each transformer record.

DV-Win Software

All results from TWR-H internal memory can be easily transferred to a DV-Win software via Bluetooth communication. This allows user to analyze results in the office, to print them, or to create customized test reports. The software is included in the purchase price.

Technical Data

Battery

- Type: Li-Ion, 14.8 V, 2.9 Ah
- Rechargeable
- User replaceable

Power Supply Adapter

- Input voltage: 90 – 264 V AC, 50/60 Hz
- Output voltage: 12-19 V DC
- Output current: 2 A DC

Output AC Source

- Voltage: 40 V, 10 V, 1 V

Output DC Source 1

- Current: 5 mA – 2 A

Output DC Source 2

- Current: 500 mA – 10 A

Turns Ratio Measurement

- Measurement range:
  0.8 – 20 000 @40 & 10 V AC
  0.8 – 4 000 @1 V AC
- Resolution: 5 digits
- Typical accuracy:

@40 V AC	@10 V AC
0.8 – 999: ±0.1%	0.8 – 999: ±0.2%
1 000 – 3 999: ±0.15%	1 000 – 3 999: ±0.2%
4 000 – 14 999: ±0.25%	4 000 – 14 999: ±0.25%
15 000 – 20 000: ±0.3%	15 000 – 20 000: ±0.3%

@1 V AC
0.8 – 999: ±0.2%
1 000 – 4 000: ±0.2%

Excitation Current Measurement

- Measurement range: 0 – 500 mA
- Range / resolution:

0.000 mA – 9.999 mA	1 µA
10.00 mA – 99.99 mA	0.01 mA
100.0 mA – 500.0 mA	0.1 mA

- Typical accuracy: ±(1% rdg + 0.5 mA)

Phase Angle Measurement

- Measurement range: 0 – 360º
- Resolution: 0.01º
- Typical accuracy: ±0.06º

Winding Resistance Measurement

- Measurement range: 1 µΩ – 3 kΩ
- Range / resolution:

0.001 mΩ – 9.999 mΩ	1 µΩ
10.00 mΩ – 99.99 mΩ	10 µΩ
100.0 mΩ – 999.9 mΩ	0.1 mΩ
1.000 Ω – 9.999 Ω	1 mΩ
10.00 Ω – 99.99 Ω	10 mΩ
100.0 Ω – 999.9 Ω	0.1 Ω
1.000 kΩ – 3.000 kΩ	1 Ω

- Typical accuracy: ±(0.5% rdg + 0.5% F.S.)

Display

- LCD 4.8” display, 240 x 128 pixels

Interface

- Bluetooth

Internal Memory

- 100 transformer records
- Each record contains up to 30 results

Warranty

- 3 years

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Environmental Conditions

- Operating temperature:
  -10 ºC – +55 ºC / +14 ºF – +131 ºF
- Storage & transportation:
  -40 ºC – +70ºC / -40 ºF – +158 ºF
- Humidity: 5% – 95% relative humidity, non-condensing

Dimensions and Weight

- Dimensions (W x H x D):
  170 x 310 x 58 mm / 6.69 x 12.21 x 2.28 in
- Weight: 1.4 kg / 3.1 lbs

Applicable Standards

- Installation/Overvoltage category: II
- Pollution degree: 2
- Safety: LVD 2014/35/EU (CE Conform)
  Standard EN 61010-1:2010
- EMC: Directive 2014/30/EU (CE Conform)
  Standard EN 61326-1:2013

All specifications herein are valid at ambient temperature of +25 °C / +77 °F and recommended accessories.
Specifications are subject to change without notice.

H winding current and sense cables with TTA clamps

X winding current and sense cables with TTA clamps

Jumper cable with TTA clamps

Power supply adapter

Plastic transport case

Test shunt

Ordering Info

Instrument	Article No
Handheld Turns Ratio & Winding Resistance Tester TWR-H	TWRH000-N-00

Included accessories
Windows-based DV-Win PC software
Power supply adapter
Plastic transport case

Recommended accessories	Article No
H winding current and sense cables 2 m (6.56 ft), 2.5 mm^2 (14 AWG) with TTA clamps	HCS-02-2MCWC
X winding current and sense cables 2 m (6.56 ft), 2.5 mm^2 (14 AWG) with TTA clamps	XCS-02-2FCWC
Jumper cable 2 m (6.56 ft), 2.5 mm^2 (14 AWG) with TTA clamps	JCX-02-2WCWC

Optional accessories	Article No
H winding current and sense cables 1 m (3.28 ft), 2.5 mm^2 (14 AWG) with TTA clamps	HCS-01-2MCWC
X winding current and sense cables 1 m (3.28 ft), 2.5 mm^2 (14 AWG) with TTA clamps	XCS-01-2FCWC
H winding current and sense cables 5 m (16.4 ft), 2.5 mm^2 (14 AWG) with TTA clamps	HCS-05-2MCWC
X winding current and sense cables 5 m (16.4 ft), 2.5 mm^2 (14 AWG) with TTA clamps	XCS-05-2FCWC
H winding current and sense cables 10 m (32.8 ft), 4 mm^2 (12 AWG) with TTA clamps	HCS-10-4MCWC
X winding current and sense cables 10 m (32.8 ft), 4 mm^2 (12 AWG) with TTA clamps	XCS-10-4FCWC
Jumper cable 1 m (3.28 ft), 2.5 mm^2 (14 AWG) with TTA clamps	JCX-01-2WCWC
Test shunt 150 A / 150 mV	SHUNT-150-MK
Plastic transport case for TWR-H	HARD-CASE-TW
Li-Ion battery 14.8 V 2900 mAh	LION-BAT-000
Verification Calibrator TRTC	TRTC-05-4800
H winding current and sense cables 1 m (3.28 ft) 2.5 mm^2 (14 AWG) with banana plugs	HCS-01-2MCBP
X winding current and sense cables 1 m (3.28 ft) 2.5 mm^2 (14 AWG) with banana plugs	XCS-01-2FCBP
Cable bag	CABLE-BAG-00

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