TAU3 ADV, PRO, EXP

True three phase transformer winding analyser

Megger

- 3 phase source and measurement for:
  - Turns ratio
    - Up to 250 V, ±0.05 % accuracy
  - Winding resistance
    - Up to 32 A, ±0.10 % accuracy
  - Adaptive demagnetization
  - Short circuit impedance
  - Transformer efficiency
  - Unique transformer vector validation
  - Phase shifting and zig-zag measurements
- Accuracy guaranteed from -20 °C to 50 °C
- Safe and efficient one-time lead connection for all tests

DESCRIPTION

Power through transformer electromechanical tests with the new TAU3, the true three-phase transformer winding analyser. In addition to routine polarity validation, turns ratio, winding resistance, and demagnetization tests, the TAU3 adds short-circuit impedance and efficiency tests with the same one-time lead connection. Guided by color-coded leads and extendable clamps with on-screen vectors that match the transformer nameplate, the easy to follow setup ensures the right result the first time - just click start and let the patent pending internal shorting and lead compensation do the work!

Three phase AC and DC output offers numerous benefits for today's demanding schedules:

- **No lead changes = faster, safer, and gives more time for testing**
- **Auto vector confirmation before every test, including winding resistance, ensures that the proper transformer vector is selected**
- **Simultaneous three-phase testing for faster results**
- **Three-phase AC power source provides accurate measurement of phase shifting transformers and zigzag vector configurations**

STANDARD FEATURES

- **Microsoft Excel export**
- **PowerDB import and export**
- **10.1" (256 mm) industrial Hi-bright touch screen**
- **Find vector, polarity recognition and validation**
- **TTR, Up to 250 V AC, ±0.05 % accuracy**
- **Excitation current**
- **Winding Resistance, with dual channel high and low side excitation up to 32 A DC, ±0.10 % accuracy**
- **Short circuit impedance**
- **Phase shifting transformer test capabilities**
- **Independent dual winding magnetization**
- **Adaptive demagnetization**
- **Magnetic balance**
- **OLTC make before break continuity testing**
- **OLTC control with breaker protection**
- **One-Touch OLTC for AC and DC tests**
- **Built in retractable handle and wheels**
- **Emergency stop**
- **Key lock**
- **Safety interlock**

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ADDITIONAL FEATURES

- Transformer efficiency
- Frequency response stray losses
- Dynamic resistance measurements*
- Winding resistance dry out*
- Winding resistance heat run*
- USB printer
- Safety beacon
- OLTC motor current monitor*
- OLTC vibration monitor*
- External temperature probes*

STEP UP TRANSFORMER TESTING

Patented in 1950, popularised in 2019, and perfected in 2024, the technology within the TAU3 provides reliable results by removing inaccuracy associated with test voltage and leads. The TAU3 automatically applies the proper test voltage and shorting connections, ensuring repeatable results.

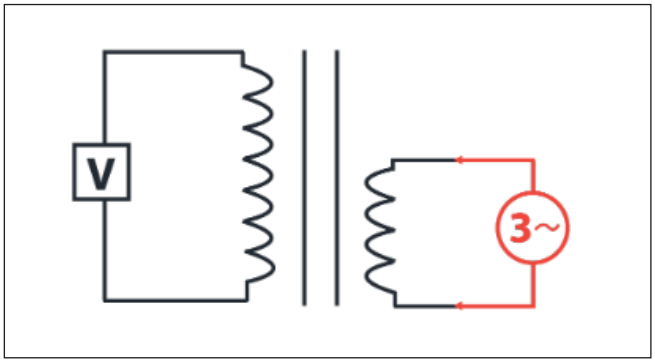
PROBLEMS TYPICALLY FOUND WITH THE TAU3

- Loose connections
- Turn-to-turn shorts
- Broken strands
- Winding deformation
- Tap changer contact problems
- Core problems

The TAU3 has been designed with a diagnostic mode, where the operator can focus on problem phases and unique tests for pinpointing and confirming where issues exist in the asset.

SAFE WITH THREE-PHASE STEP UP

Safety is the first priority at Megger, which is why the TAU3 is CE Certified to IEC 61010 - Safety requirements for electrical equipment for measurement, control, and laboratory use. During a test, software will perform safety checks before applying full test voltage. In addition, the TAU3 utilizes modern hardware to protect the asset and operator in the event of faults.



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DETAILED DESCRIPTION

The TAU3 is designed to test all power, instrument (CTs and PT/VTs), and distribution transformers. With minimal input from the user, the TAU3 uses patent pending step up excitation to deliver the required AC/DC voltage and current to obtain accurate results.

With simultaneous three-phase excitation, testing completes faster and safer than switched three-phase and single-phase instruments. A single ladder climb and one-time lead connection reduces time spent on top of transformers. Once connected to the transformer, a key lock, safety interlock, and an emergency stop ensure testing starts and stops safely.

Shock mounted electronics are housed in a compact, wheeled, and water tight case that's up to 75 % lighter/ smaller than other multifunction electromechanical test solutions.

Find vector / polarity recognition

Find vector provides confidence in transformer results by performing vector group discovery and validation before every test. Windings such as zigzag, can be mistakenly seen as a delta, so the operator is required to validate the intended winding to be measured. Failure to do so could have catastrophic consequences when system voltage energizes the transformer.

TTR - Turns ratio testing

When compared to traditional single-phase step down test instruments, the user is no longer required to know the proper test voltage required to obtain a valid result when using the TAU3. The TAU3 utilises three-phase step up ratio technology, providing safe, repeatable, and reliable results. When the TAU3 detects an issue with a phase, a diagnostic mode allows pinpointing of issues where traditional ratio instruments fail to operate/test.

Excitation current

Included with turns ratio testing, the excitation current test is extremely useful in locating problems such as defects in magnetic core balance, magnetic core structure, shifting of windings, failures in the turn-to-turn insulation, or problems in tap changers.

Phase angle deviation

Phase angle deviation (not to be confused with phase shift) is the phase relationship between in-phase vectors of the high side versus the low side windings. Phase deviation denotes the quality of the core and the winding, and when functioning properly should exhibit very low values (< 0.1°). Shorted or partial shorted turns and/or a deteriorated or damaged core can cause significant changes in the phase deviation values.

Magnetic balance

Magnetic balance assess the health of the windings, core assembly condition, and flux distribution within the transformer. This test, performed safely and efficiently by the TAU3, is a measure of how well balanced (electrically) the transformer is versus nameplate specifications.

Winding resistance

Efficiently test winding resistance with three-phase dual winding DC output of the TAU3. 100 V DC open circuit voltage quickly saturates the transformer core as independent current sources for H and X channels deliver stable and accurate measurements for each winding under test. No lead changes are required to switch from phase to phase - select auto save and the TAU3 does all the work. If one phase is out of limits, the user interface simplifies investigation by highlighting the problem phase and guiding the user through the results validation process.

OLTC make before break continuity

When performing winding resistance tests across multiple OLTC taps, make before break testing automatically verifies continuity of the tap changer connections. This first level diagnostic mode is useful in determining when dynamic resistance measurements are appropriate for further investigation.

Automatic adaptive demagnetization

Adaptive demagnetization removes remanence (magnetization) that remains after winding resistance tests are complete. The TAU3 avoids costly nuisance trips of protection equipment with automatic demagnetization performed after each winding resistance test.

Short circuit impedance

Three-phase patent pending internal shorting and lead compensation means that the connection requirements for short circuit impedance tests are the same as all the other tests - completed with one ladder climb.

Phase shift measurements

Today's industrial power systems and utility power grids utilise transformers with multiple secondaries with differing phase angles in various vector configurations, including zigzag windings. The new TAU3 handles each phase displacement as easily as standard three-phase transformer vector configurations, and provides independent results for each phase.

One-Touch OLTC

Save time testing with One-Touch OLTC. Connect to the transformer OLTC with the included cables and run through an entire OLTC with one click. One-Touch OLTC is available for both AC and DC, providing maximum test efficiency.

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SOFTWARE, SAVING, AND PRINTING

Minimise training time with the intuitive 10.1in user interface of the TAU3. Large, self-explanatory buttons guide operation, while on screen vectors provide reassurance that the transformer nameplate matches the test setup. When exported, results are grouped by file name, producing an XLSX/PDF report that is easy to read, email, or import into PowerDB. When needed, the optional USB printer can print results on demand.

When you connect the TAU3 to your PC, not only can you control the device, but a USB drive will appear. The user manual, datasheet, and TAU3 PC application installer can be found on this drive so you always have the necessary documentation and applications on hand.

Frequency response stray losses (FRSL)

Frequency response stray losses is a short circuit test performed at different frequencies. As with other variable frequency tests, additional diagnostic information is available when looking at frequencies other that 50 or 60 Hz.

PowerDB control*

If you're looking to step up your reporting, use PowerDB to configure and execute your tests. With PowerDB you can produce consistent test reports from all of your Megger instruments.

Dynamic resistance measurements (DRM)*

Dynamic resistance measurements are an advanced diagnostic test for on-load tap changers. Pinpoint issues in on-load tap changers with individual resistor values and vibration and motor current profiles.

Heat run – internal temperature*

Winding resistance cool down is an advanced diagnostic tool to determine the maximum temperature of a winding immediately after removal from full power.

Dry out – internal temperature*

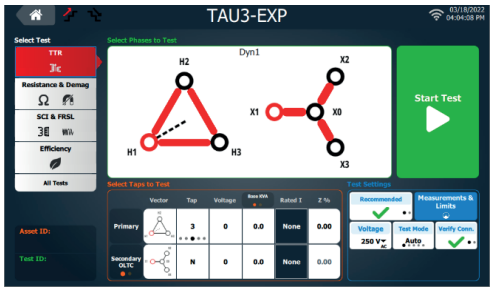
A transformer may need to go through a dry out process before going into service. This dry out process requires the internal temperature to remain steady for a set amount of time. Provide a reference temperature and resistance, and the TAU3 will report the temperature of the winding.

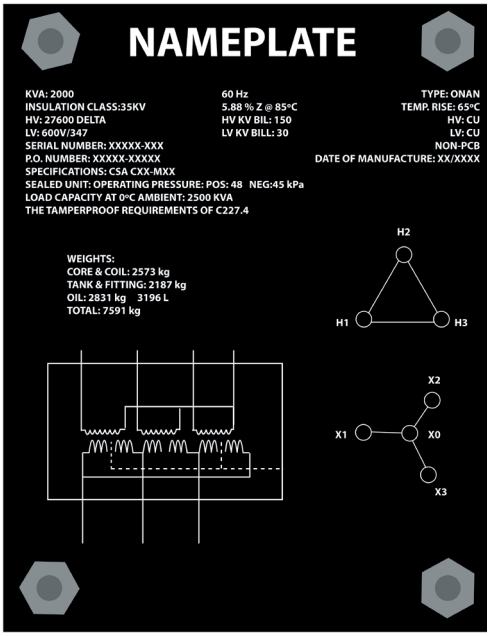
Transformer losses / efficiency

Realise a transformers impact on transmission and distribution utilisation and revenue with the transformer efficiency test. Measurements adjusted for temperature and expected load provide distinct efficiency profiles for each transformer. Per phase load and no-load losses provide additional diagnostic information for those looking to get the most out of their renewable networks.

Custom application control

With custom app control, any program can control the TAU3 through the API. Great for organisations looking to push their test program to the limit! Nondisclosure agreement required for access to the API.





Compare nameplate vector to images on screen

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UNIVERSAL LEAD SET

The three-phase universal lead set simplifies connecting to any transformer. The durable kelvin clamps extend up to 3 in for connecting to any bushing size. Lead spans range from 5 m (15 ft) to 30 m (100 ft), ensuring secure connection and test capabilities for all transformer shapes and sizes. Connecting all leads in one ladder climb greatly reduces the risk of fall injuries and test time. Existing customers are able to use legacy lead sets with the TAU3. See the tables to the right for details.

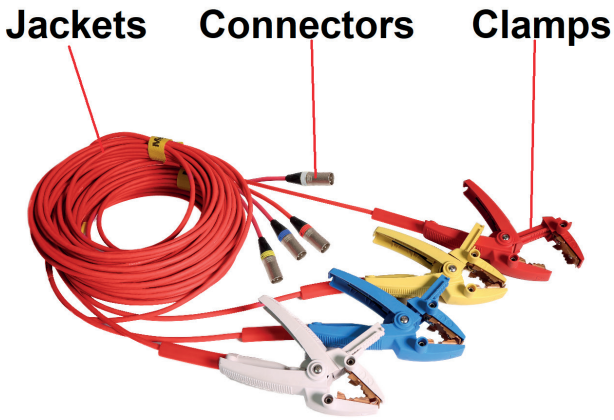
The kelvin clamps also accept safety banana plugs, simplifying connection to a CT terminal block. Clearly displayed electrical shock and potential markings on the clamp inform operators how to connect safely and securely.

H leads PNs that can be used with any TAU3 model	X lead PNs that can be used with TAU3 BASIC and TAU3 ADV" to "X lead PNs that can be used with TAU3 BASIC and TAU3 ADV
2008-001-XXX 2008-002-XXX 2008-003-XXX 2008-004-XXX	2008-005-XXX 2008-006-XXX 2008-007-XXX 2008-008-XXX

XXX denotes length

Color coded leads for quick setup and verification

32 A X leads
TAU3 PRO, TAU3 EXP



16 A H leads
TAU3 BASIC, TAU3 ADV, TAU3 PRO, TAU3 EXP

16 A X leads
TAU3 BASIC, TAU3 ADV

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SPECIFICATIONS - Valid from -20 ° to +50 °C

Input power

100-240 V AC, 47-63 Hz, 1200 W
±10% Mains supply voltage fluctuations Overvoltage category II

Output power

Voltage	3-phase, 1-100 V
Frequency	DC, 40-480 Hz
Current	0.1 mA – 1 A @ 100 V
Current	0.1 mA – 32 A @ 24 V

Regulatory

Safety	IEC 61010-1:2010 + AMD1:2016
EMI/EMC	IEC 61326-1:2012
RoHS2	EN50581
Vibe/Shock	MIL-STD-810G
Ingress protection	IP65 (Lid closed)

Transformer testing standards

IEEE	C57.152-2013
IEC	60076-1:2011
AS/NZS	6076 1:2014
CIGRE	445 2 011
GOST	3484.1-88

Dimensions

55.8 x 28.7 x 19 cm
22 x 11.3 x 7.5 in

Weight

15 kg 33 lbs

Case

Rugged case with built in wheels and handle

Backpack lead bag for leads and accessories

Internal/external data storage

Up to 10 000 sets of three-phase results internal storage

Transferable via USB 2.0 drive

Communication/control software

USB Interface for PC Control with custom GUI

Touch screen (optional)

25.6 cm 10.1 in

1024 x 600 Resolution

1000 NITS

Printer (optional)

51 mm (2 in) thermal printer

Prints all measurement data displayed on GUI

Environmental

Operating	-20 ° to 50 °C (-4 ° to 122 °F)
Storage	-30 ° to 70 °C (-22 ° to 158 °F)

Relative Humidity 0-90 %, non-condensing

Indoor and outdoor use in dry locations
Elevation 2000 m MAX
Pollution degree 2

TTR

Turns ratio measurement methods

3-phase step up

3-phase step down

1 phase step up

1 phase step down

Turns Ratio Range and Accuracy

Step Down Excitation

25-100 V

±0.05 % 0.8 – 1000

±0.10 % 1001 – 2000

±0.30 % 2001 – 15000

±0.60 % 15001 – 50000

1-24 V

±0.10 % 0.8 – 1000

±0.20 % 1001 – 2000

±0.60 % 2001 – 15000

Step Up measurement

25-250 V

±0.05 % 0.8 – 200
(most Power Tx)

1-24 V

±0.10 % 0.8 – 200

Excitation current resolution

Resolution	0.1 mA, 0.1 mA – 100 mA
	1.0 mA, 101 mA – 11 A
Excitation current accuracy	±1 % Reading, ±0.1 mA
Frequency accuracy	±1 % Reading, ±0.1 Hz
Phase range	Range 0 – 360 °
Phase accuracy	±0.05 °
Max voltage output	90 VACpk
Voltage accuracy	Typical ±0.1 % reading, ±0.1 mV Guaranteed ±0.5 % reading

Specified accuracy for external verification only and does not impact AC tests accuracy (TTR, Magnetic Balance, SCI, FRSL, or Losses)

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WR

Resistance measurement methods

1 phase wye, delta, zigzag
2 phase wye w/neutral
3 phase wye w/neutral
Dual winding excitation

DC Open circuit voltage Up to 100 V

DC Measurement voltage Up to 100 V

Resistance accuracy ±0.10 % reading, ±1 µΩ

Resistance resolution 5 digits

DC voltage accuracy ±0.05 % reading, ±0.1 mV

DC current accuracy ±0.05 % reading, ±0.1 mA

Current and resistance ranges

Typical with 9 m (30 ft) leads

Current	Min Ω	Max Ω
32 A	1.0 µΩ	400 mΩ
16 A	1 mΩ	1.0 Ω
8 A	1.0 Ω	2.0 Ω
1 A	2.0 Ω	20 Ω
100 mA	1.0 Ω	100 kΩ

Dynamic resistance measurement method Dynamic voltage
Dynamic current
Dynamic resistance

Dynamic Resistance Speed

Speed 20 kHz

SCI FRSL

Impedance measurement methods

1 Ø

Frequency range 40 – 480 Hz

Impedance measurement range 0.1 Ω - 700 Ω

Impedance accuracy ±1% reading, ±0.10 mΩ

Reactance measurement range 0.1 Ω - 700 Ω

Reactance accuracy ±1 % reading, ±0.10 mΩ

Inductance accuracy ±1 % reading, ±10 µH

Power factor range 0.1 % – 100 %

Power factor accuracy ±5 % reading

AC Current accuracy ±0.2 % reading, ±0.1 mA

EFFICIENCY

Core loss measurement methods Hysteresis losses
Eddy current losses

Core loss accuracy ±10 % of actual losses

AC copper losses accuracy at 85 °C

±10 % of actual losses

DC copper losses accuracy at 85 °C

±10 % of actual losses

Motor current measurement (optional)

9 V battery power

Measuring range: 3.0 A/30 A

Frequency range: DC to 60 Hz

Resolution: ± 50 mA / ± 100 mA

Accuracy: ±1 % reading

Temperature probe measurement (optional)

Range: -20 °C to 110 °C

Accuracy: ±1 % reading. ± 1.0 °C

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TAU3 Selection Guide			
Model	**TAU3 ADV**	**TAU3 PRO**	**TAU3 EXP**
10.1" Hi-bright display		■	
Max turns ratio	50 000 down / 100 Up	50 000 down/**200 Up**	
Max induced voltage	125 V	**250 V**	
Max current	16 A	**32 A**	
Polarity recognition and validation		■	
Excitation current measurements		■	
Short circuit impedance		■	
Adaptive demag		■	
Phase shifting Tx measurements		■	
Independent dual winding magnetization		■	
Magnetic balance		■	
OLTC make before break continuity testing		■	
One-Touch OLTC for AC and DC tests		■	
Built in wheels and retractable handle		■	
Emergency stop		■	
Key lock		■	
Safety Interlock		■	
Microsoft® Excel® export		■	
PowerDB import		■	
PowerDB control*	Optional		■
Custom app control	Optional		■
Frequency response stray losses measurements	Optional		■
Dynamic resistance measurements*	Optional		■
Winding resistance dry out*	Optional		■
Winding resistance cool down*	Optional		■
USB printer	Optional		■
Safety beacon	Optional		■
Motor current monitor*	Optional		■
Vibration monitor*	Optional		■
External temperature probes*	Optional		■
Transformer efficiency measurements	Optional		Optional

■ = INCLUDED

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True three phase transformer winding analyser

ORDERING INFORMATION

Item (Qty)	Cat. No.
True three-phase transformer winding analyser	TAU3-ADV

Accessories required for operation

Choose one lead kit for the TAU3 ADV

16 Amp H leads with red jacket and red, yellow, blue, and white clamps (4 total)

16 Amp X leads with black jacket and red, yellow, blue, and white clamps (4 total)

5 m (15 ft) H and X leads	2008-15KIT2
9 m (30 ft) H and X leads	2008-30KIT2
18 m (60 ft) H and X leads	2008-60KIT2
30 m (100 ft) H and 18 m (60 ft) X leads	2008-100KIT2

Optional lead accessories

TAU3 ADV 16 A H and 16 A X lead extensions

9 m (30 ft) H and X extensions	2008-30XKIT2

Item (Qty) For Price List	Cat. No.
True three-phase transformer winding analyser	TAU3-PRO TAU3-EXP

Accessories required for operation

Choose one lead kit for the TAU3 PRO or TAU3 EXP

16 Amp H leads with red jacket and red, yellow, blue, and white clamps (4 total)

32 Amp X leads with black and white stripe jacket and red, yellow, blue, and white clamps (4 total)

5 m (15 ft) H and X leads	2008-15KIT3
9 m (30 ft) H and X leads	2008-30KIT3
18 m (60 ft) H and X leads	2008-60KIT3
30 m (100 ft) H and 18 m (60 ft) X leads	2008-100KIT3

Optional lead accessories

TAU3 PRO and TAU3 EXP 16 A H and 32 A X lead extensions

9 m (30 ft) H and X extensions	2008-30XKIT3

Included accessories - BASIC, ADV, PRO, EXP	
AC power cords (US, EU, UK)	1014-927
USB 2.0 Cable	CA-USB
OLTC tap changer cable	1011-622
Cable Bag – Backpack	2012-180
Ground Lead 4.5 m (15 ft)	4702-7
USB drive	90012-878
Included accessories - PRO	
Second Cable Bag - Backpack	2012-180
Included accessories - EXP	
Second Cable Bag - Backpack	2012-180
OLTC Tap changer cable adapters	1011-622-A
USB printer	90029-573
Safety beacon - 18 m (60 ft)	1004-639
Optional software accessories	
PowerDB control	SW-POWERDB
Custom application control	SW-CUSTOMAPP
Transformer efficiency measurements*	SW-EFFICIENCY
Frequency response stray losses measurements	SW-FRSL

Optional software accessories cont.	
Dynamic resistance measurements*	SW-DRM
Transformer dry out measurements*	SW-DRYOUT
Transformer heat run measurements*	SW-HEATRUN
Optional hardware accessories	
Calibration certification	TAU3-CAL-CERT
Safety beacon – 18 m (60 ft)	1004-639
Transit case (for instrument)	1014-928
USB printer	90029-573
USB printer paper (x48 rolls)	90029-573-P
1:1 test jig	2005-249
OLTC Tap changer cable adapters	1011-622-A
Motor current monitor*	1014-929
Vibration monitor*	1014-930
Temperature probe kit*	1014-931
TRS1+ calibration standard	TRS1PLUS
TOS1 calibration standard	TOS1

*Coming 2024!

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