Order Code: 20213532.1
Name: Transformer and Substation Test

Transformer and Substation Test System

- **Replaces need for multiple test sets**
- **Saves time by eliminating need for multiple instruments learning**
- **User-friendly interface reduces training and testing time**
- **Portable and compact parts for easy shipping**
- **State of art measurement methods for advanced diagnostic testing**

Description

TRAX is a multi-functional test set solution for transformer substation testing. The test system replaces numerous individual testing devices which makes testing with TRAX a time saving and cost effective alternative to conventional measurements using separate instruments.

TRAX is a unique test system for testing power, distribution and instrument transformers, as well as a variety of other substation components. Providing up to 800 A and 2200 V (2000 A and 12 kV with accessories) with a frequency range adjustable from 5 Hz (1 Hz with tan delta unit) to 500 Hz, TRAX can be used with an integrated touch screen or external computer device with web browser.

These variable levels of voltage and current can be generated and measured with high precision, allowing TRAX to be used for a wide range of applications such as turns ratio, excitation current, winding and contact resistance, impedance, tan delta/power factor testing and various primary tests for LV, MV and HV electrical apparatus including but not limited to:

- Power & distribution transformers
- Instrument transformers
- Bushings
- LV, MV and HV circuit-breakers
- Busbars
- Protection relays
- Grounding systems

The TRAX multifunction instrument is designed to be a complete solution in transformer testing. With its 100 A at up to 50 V compliance voltage it is a high efficiency, high accuracy and excellent performance transformer test set.

Test capability:

- Winding resistance measurements
- Adaptive algorithm for optimized transformer demagnetization
- True dynamic resistance measurements on load tap-changers
- 250 V transformer turns ratio measurements
- 12 kV dissipation factor and capacitance testing features

The user interface allows fully manual control where the user defines a specific test setup. Alternatively, a variety of individual instruments/apps are available to perform automated testing procedures such as winding resistance, turns ratio, impedance measurements, relay testing, circuit breaker analysis and more. The tests can be organized and reported as separate tests or as a combined full set of test results for the same asset.

Note: Specifications are subject to change, Photos shown above are Indicative, Actual Product can Vary.

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Features and benefits

- **One unit multi function system for transformer/substation testing**
  - Replaces need for multiple test sets
  - Saves time by eliminating need for multiple instruments learning
  - User-friendly interface reduces training and testing time
  - Portable and compact parts for easy shipping
- **Outstanding flexibility for selecting output current or voltage signals for various tests**
  - AC current up to 2000 A (with TCX 200)
  - DC current up to 100 A
  - AC voltage up to 12 kV (with TDX 120)
  - DC voltage up to 300 V
- **State of art measurement methods for advanced diagnostic testing, e.g.**
  - 3-phase Power transformer measurements of:
    - **Turns ratio**
    - **Winding resistance**
    - **Load tap-changer continuity, timing and dynamic resistance (patent pending)**
    - **Excitation current**
    - **Leakage reactance/short-circuit impedance**
    - **Demagnetization**
    - **3-phase transformer measurements (with TSX300)**
  - CT and VT testing
  - HV tan delta/power factor (with TDX 120)

User interface

TRAX user interface architecture is based on a number of individual instruments/apps where only the necessary functionality is displayed by default. For manual testing a generic instrument is available where the user selects output, measurement inputs and how the data should be processed.

For testing complete components (e.g. power transformers), measurement results from multiple instruments can be collected and presented in one report.

Start screen / My TRAX

Manual Control

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Excitation current

Winding resistance

Oscilloscope

Turns ratio

Application

A variety of voltage and current levels can be generated and measured with high precision which allows the test system to be used for a wide range of applications. Examples are:

- **Power transformer**
  - Ratio and phase
  - Winding resistance
    - **Single phase up to 100 A**
    - **Three-phase/six windings up to 16 A**
  - Tap changer testing (single-phase or three-phase)
    - **Continuity**
    - **Dynamic current**
    - **Dynamic voltage**
    - **Dynamic resistance (new patent pending method)**
  - Demagnetization (adaptive method for fast and efficient process)
  - Magnetic balance
  - Excitation current
  - Leakage reactance/short-circuit impedance
  - Zero-sequence impedance
  - Frequency response of stray losses (FRSL)
  - Tan delta/power factor with individual temperature correction (ITC) and voltage dependence detection (VDD)
  - Capacitance
- **Current transformer**
  - Ratio, burden and polarity
  - Phase and magnitude error
  - Excitation curve (knee-point)
  - Winding resistance
  - Secondary burden
  - Dielectric withstand voltage
- **Voltage transformer**
  - Ratio and polarity
  - Phase and magnitude error
  - Secondary burden
  - Dielectric withstand voltage
- **Resistance testing**
  - Contact resistance
  - DualGround™ measurements
- **Circuit breaker testing**
  - Main and resistor contact timing
  - Motion
  - Operating voltage
  - Coil current
  - Contact resistance
- **Primary testing**
  - Circuit breakers
  - General primary injection tests
- **Protection relays**
  - Single phase testing of primary and secondary relays (> I, < I, > V, < V, > f, < f)
- **AC insulation testing**
  - Tan delta/Power factor
  - Capacitance
  - Tip-up testing
  - 1-505 Hz frequency range

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Specification

Specifications are valid at nominal input voltage and an ambient temperature of +25°C ±5°, (77°F). Specifications are subject to change without notice.

Evironment	
Application field	For use in high-voltage substations and industrial environments
Temperature	
Operating	20°C to +55°C (68°F to +131°F)
Storage	-20°C to +70°C (-4°F to +158°F)
Humidity	< 90%RH, non-condensing
CE- marking	
EMC	2004/108/EC
LVD	2006/95/EC
General	
Mains input	100-240 V, 50/60 Hz (± 10%)
Input current	≤ 16 A continuous Short-term up to 30 A < 60 s
Display	Size: 10.4" Resolution: 1024x768 XGA Type: TFT touch Contrast ratio: 1000:1 Nits: 1000

Binary output	2 x 0-10000 s	Output contacts for LTC and CB operation with internal voltage and current measurements
Measurements		Internal U and I measurements on generator outputs
Inputs		
General AC/DC current	4 x 0-10 A	Auto ranging
General AC/DC voltage	4 x 0-250 V	Auto ranging
DC voltage	2 x 0-50 V	For resistance measurements
Binary input/timing	3 x 0-10000 s	Contact or voltage sense
Trig input		Contact or voltage sense
Accuracy		
External AC/DC voltage and current	0.05% of reading + 0.05% FS	
Internal DC current	0.1% of reading + 0.1% FS	
Internal AC current	0.2% of reading + 0.2% FS	
Internal AC voltage	0.2% of reading + 0.2% FS	

Outputs

Item	Specification	Comment
Frequency range, all AC outputs	5-505 Hz	1-505 Hz with TDX accessory Derating at frequencies below 50 Hz, linear voltage drop
AC output power	Max 5 kVA, 10 s Max 2.5 kVA, 1 min Max 1 kVA, 30 min	
800 A AC output	0-800 A/6 V, 10 s 0-250 A/10 V, 1 min	TRAX220: 0-200A, 1 min 0-20A continuous
10 A AC output	0-10 A/250 V, 1 min 0-20 A, 10s	
2000 A AC output	0-2000 A/2.5 V, 1 min 0-1000 A/5 V, 1 min	With TRAX TCX accessory
DC output power	Max 1000 VA, 1 min Max 700 VA, cont Max 50 V compliance voltage	
100 A DC output	100 A, max 1 min 0-70 A, continuous	
16 A DC output	0-16 A continuous	
	0-1 A continuous	Same output connectors as 16 A, but different generator selection in SW
250 V AC output	Max 2500 VA 0-250 V/10 A, 1 min	
2200 V AC output	Max 2500 VA 0-2200 V/1 A, 1 min	
12 kV AC output	0-12 kV/450 mA, 1 min 0-12 kV/300 mA, 4 min 0-12 kV/100 mA, continuous	With TRAX TDX accessory
300 V DC output	0-300 V/10 A	Rectified DC. Intended to be used as e.g. auxiliary DC supply

Calculated / displayed parameters	
Arithmetic	+, -, *, /
Power	P, VA, Q, S, Watts
Impedance	R (DC), Z, Xp, Xs, Rs, Rp, Ls, Lp, Cs, Cp, phase
Time	Binary start-stop-change, generator start-stop, trig to event
User defined formulas	

Derating at low mains voltage

Max rating at 230-240 mains voltage is 4800 VA.
When mains voltage is 100-120 V, the max output is limited to 3200 VA, suggesting 33% lower output power at 100 V.

Derating at high ambient temperature

Max output time will be shorter when using the TRAX in ambient temperature >25°C. See the user manual for details.

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