

Tri-Phase™

True 3-Phase Transformer Ratio Tester



Vanguard Instruments Company

Simplify the Test



Tri-Phase™

A True 3-Phase Transformer Turns-Ratio Tester

Vanguard's new TRI-PHASE™ is a true 3-phase transformer turns ratio tester designed to conform to the IEEE C57.12.90 measurement method. The TRI-PHASE™ outputs a 3-phase excitation test voltage to the three transformer primary windings. The induced 3-phase secondary voltages are sensed and the transformer turns ratio is calculated. The TRI-PHASE™ is capable of measuring turns ratios from 0.8 to 15,000. The 3-phase excitation current, phase angle readings along with the turns ratios are displayed on the built-in LCD. Since a 3-phase voltage is used to excite the transformer windings, the TRI-PHASE™ can detect and measure turns ratios of any transformer type. The TRI-PHASE™ can easily measure the turns ratio of phase-shifting transformers where other 3-phase transformer ratio testers cannot.

The TRI-PHASE™ can be used in a stand-alone or in a computer controlled mode. An alphanumeric keypad and a rotary switch provide the TRI-PHASE™ local control. Test results and control menus are displayed on a 64 x 128 graphic LCD. A built-in 4.5" thermal printer allows the user to print test reports in the field.

The TRI-PHASE™ is capable of storing up to 112 test records and 128 test plans in Flash EEPROM memory. Test records or test plans can be stored or transferred to or from an IBM compatible PC via the interface ports (RS-232C or USB) or by using the built-in USB flash drive interface port.

Transformer Test Voltage

The TRI-PHASE™ generates its own 3-phase transformer test voltages from the single-phase AC or DC power input. Three test voltages (8 Vac, 40 Vac, 100 Vac) allow the TRI-PHASE™ to test CTS and PTs as well as power transformers.

Auto-Detect Transformer Configuration

The TRI-PHASE™ is capable of detecting specific vector diagrams for different types of transformers. It is capable of detecting 130 different 3-phase transformer types defined by ANSI, IEC, and Australian standards plus phase shifting transformers.

Operator Interface and Display

In stand alone mode, the TRI-PHASE™ displays messages and test results on the built-in 64 x 128 graphic LCD screen. Transformer turns ratio, excitation current, phase angle and percentage error are displayed. Operator control inputs are entered via a 16-key keypad and digital rotary switch.

Transformer Test Plan

The TRI-PHASE™ can store up to 128 transformer test-plans in its Flash EEPROM. A test-plan comprises transformer nameplate voltages for each tap setting. The calculated turns ratio based on the nameplate voltages is used to compare with the measured turns ratio. By recalling a test plan, the user can quickly test a transformer and view turns ratio Pass/Fail reports. Test plans are created with the PC software and downloaded to the TRI-PHASE™ via the interface ports (RS-232C or USB) or stored on a USB Flash Drive and later transferred to the TRI-PHASE using the USB flash drive port.

Test Record Storage Capabilities

Up to 112 test records can be stored in the TRI-PHASE™ Flash EEPROM memory. Each test record may contain up to 33 turns-ratio, excitation current, phase angle, and name plate voltage readings. Test records can be recalled locally or down loaded to an IBM compatible PC via the interface ports (RS-232C or USB) or stored/retrieved from a USB Flash Drive.

USB Flash Drive

A built-in USB Flash Drive port allows the user to store/retrieve transformer test plans or test records to and from a USB Flash Drive. Up to 999 transformer test plans can be stored on the Flash Drive. Test plans can also be transferred from the PC to the Flash Drive. Further, a specific test plan on the Flash Drive can be transferred to the TRI-PHASE's internal Flash memory. Up to 999 test field-generated records can be stored on the Flash Drive. Test records stored in the TRI-PHASE's internal memory are easily transferred to the Flash Drive for further analysis on a PC compatible computer.

Computer Interface

In the computer interface mode, the unit can be controlled via the RS-232C or USB port using the Tri-Phase PC software. A Windows XP/Vista based software (transformer turns-ratio analysis application, provided with each Tri-Phase) allows the user to test and store test results on a PC. Test results can be exported into Excel.

Thermal Printer

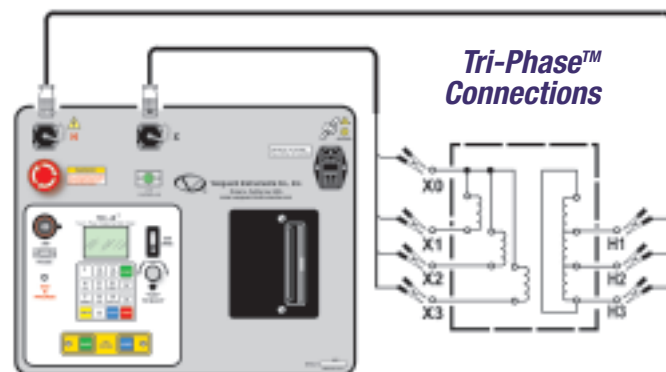
A 4.5 inch-wide thermal printer prints test results in a 14 point font for easy viewing. Printer and paper are mounted under the front panel for protection.

Transformer Load Tap Changer Control

A built-in transformer load tap changer allows the user to change transformer tap positions remotely. This remote-controlled tap changer feature eliminates the need to manually change the transformer's step-up and step-down taps.

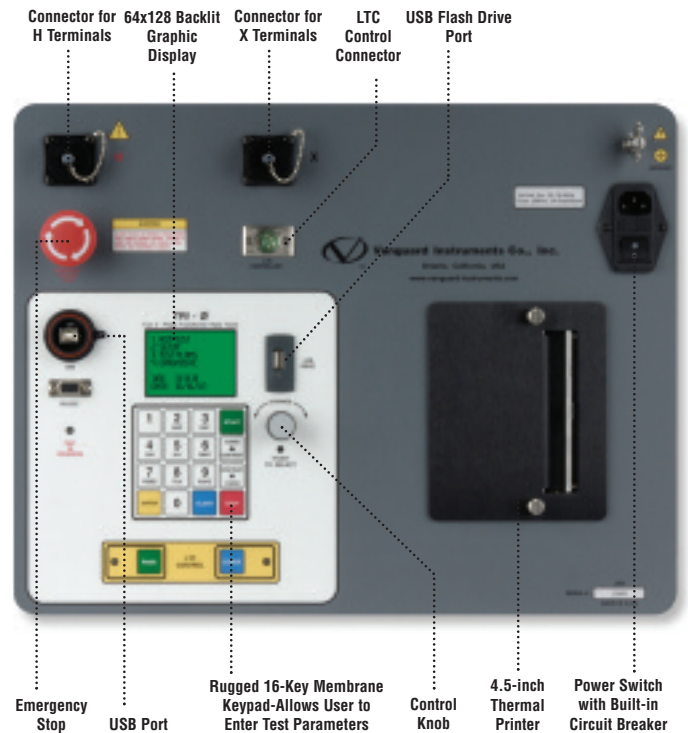
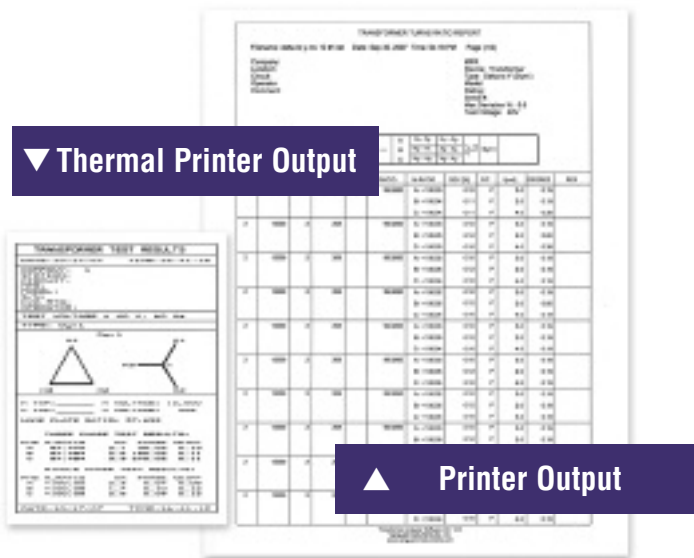
TRI-PHASE™ Input Power Sources

The TRI-PHASE™ can be powered from a single phase 100-264 Vac 50/60 Hz. A built-in safety ground detection circuit will detect and display a ground fault problem with the AC input source.



3-Phase Transformer Ratio Test

Efficient Procedure of 3-Phase Current-Transformer Testing with Vanguard's Tri-Phase™ Transformer Ratio Tester



Ordering Information • Tri-Phase™ 3-Phase Transformer Ratio Tester
 Tri-Phase™, Cable, Software Part No: Tri-Phase™ Cable
 Tri-Phase™ Shipping Case Part No: Tri-Phase™ Shipping Case
 4.5-inch Printer Paper Part No: Paper TP4

SPECIFICATIONS

TYPE	3-Phase Transformer Ratio Test Set
PHYSICAL DIMENSIONS & WEIGHT	21"W x 17"H x 9"H (53 cm x 43 cm x 24 cm) • 35 lbs (15.8 Kg)
INPUT POWER	3 amps, 100-240 Vac, 50/60 Hz
MEASUREMENT METHOD	ANSI/IEEE C57.12.90
TURNS-RATIO MEASURING RANGE	0.8 to 15,000 (5-digit Resolution)
TURNS RATIO ACCURACY	0.8 to 999: ±0.1%, 1000 to 1599: ±0.2%, 1600 to 9999: ±1%, 10,000 to 15,000: 1.5% @ 8 Vac 0.8 to 999: ±0.1%, 1000 to 1599: ±0.2%, 1600 to 9999: ±1%, 10,000 to 15,000: 1.5% @ 40 Vac 0.8 to 999: ±0.1%, 1000 to 1599: ±0.2%, 1600 to 9999: ±1%, 10,000 to 15,000: 1.5% @ 100 Vac
TEST VOLTAGE	Three phase, 8 Vac @ 1Amp, 40 Vac @ 0.2 Amp, 100 Vac @ 0.1 Amp
EXCITATION CURRENT READING RANGE	0 to 2 Amperes
EXCITATION CURRENT READING ACCURACY	±0.1 mA, ±2% of reading (±1 mA)
PHASE ANGLE MEASUREMENT	0 – 360 Degrees
PHASE ANGLE ACCURACY	± 0.2 Degree (± 1 Digit)
DISPLAY	Back-lit LCD screen, 64 x 128 dot graphic display, Viewable in Bright Sunlight
PRINTER	4.5-inch thermal printer
USB FLASH DRIVE INTERFACE	One USB Flash Drive Interface port
COMPUTER INTERFACE	One RS-232C and one USB interface ports
PC SOFTWARE	Windows XP/Vista-based Transformer Turns-Ratio Analysis Program included with purchase price
TEST RECORD STORAGE	Maximum 112 transformer test records including test record header and up to 33 readings. Up to 999 transformer test records can be stored on the USB Flash Drive.
TEST PLAN STORAGE	The unit can store 128 transformer test plans. Test plans are transferred to the unit from PC via the RS-232C, USB port or USB Flash Drive.
LOAD TAP CHANGER CONTACT	240 Vac, 2 Amps
SAFETY	Designed to meet UL 61010A-1 and CAN/CSA C22.2 No. 1010.1-92 certification.
ENVIRONMENT	Operating: -10° to 50° C (15°F to +122° F); Storage: -30° C to 70° C (-22°F to +158° F)
CABLES	(1) 15ft Single-phase set, (1) 15ft 3-phase set, (1) 25ft extension set, (1) safety ground, (1) USB, (1) RS-232C Cable, Cable Bag
OPTIONS	Transportation Case
WARRANTY	One-Year parts & labor

Note: The above specifications are valid at nominal voltage and ambient temperature of +25°C (+77°F). Specifications are subject to change without notice.

Set

Vanguard Instruments Company
 Reliability Through Instrumentation

Instruments Designed and Developed by the Hearts and Minds of Utility Electricians Around the World

You've seen a lot of utility test equipment in your time. You work with it routinely. Your facility relies upon it to ensure peak performance. Often times, your maintenance tasks are tedious, time-consuming and repetitive. But timely and accurate information is the currency of maintaining maximum uptime and minimal repair, thus testing must be done. Your instruments must be up to the task.

Vanguard Instruments is familiar with your problems and shares in your desire to make transformer and breaker testing fast, reliable, and simple. These principles are the basis for every Vanguard design. They also form the premise for our ongoing research and development as well as every innovative feature we introduce.

How do we know what you're looking for in utility test equipment? We're there in the trenches with you! Our Chief Engineer is frequently on-site at power utility sub-stations around the country and all over the world; working, listening and talking with electricians and technicians just like you. More than that, you've shown us the real nitty-gritty of testing. We've taken that to heart and then back to the lab to solve your problems. The results of your recommendations are embodied in utility test equipment that is easy to use, lightweight, rugged and dependable. The Tri-Phase™, along with Vanguard's full line of test equipment, leads the industry in accuracy and automatically performs a range of tasks and calculations that were once the bane of every utility electrician.

We hope that you will take a few moments to consider the technological innovations that are engineered into every Vanguard test instrument. Equally important, we want to know that our past efforts make a present difference in your testing routines and on-line uptime. We're not done though. You can be confident we're looking for new ways to improve the results of your testing regimen. Thanks for choosing Vanguard Instruments.



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