

# Tri-Phase™

True 3-Phase Transformer Ratio Tester



**Vanguard Instruments Company**



# Simplify

## **Transformer Test Plans**

The Tri-Phase can store up to 128 transformer test plans in its Flash EEPROM. A test plan is comprised of the transformer nameplate voltages for each tap setting. The calculated turns-ratio based on the nameplate voltages is compared with the measured turns-ratio. By recalling a test plan, a transformer can be quickly tested and turns-ratio Pass/Fail reports can be reviewed. Test plans can be created with the included PC software and can be transferred to the Tri-Phase via the available interfaces (RS-232C port, USB port, USB Flash drive port).

## **Internal Test Record Storage**

Up to 112 test records can be stored in the Tri-Phase's Flash EEPROM. Each test record may contain up to 33 turns-ratio, excitation current, phase angle, and nameplate voltage readings. Test records can be recalled locally or transferred to a PC via the available interfaces (RS-232C port, USB port, USB Flash drive port).

## **USB Flash Drive Interface**

A built-in USB Flash drive interface provides a convenient method for transferring test plans and test records to or from a USB Flash drive. Up to 999 transformer test plans and test records can be stored on a USB Flash drive, and the supplied PC software can be used to view the test records. Test plans created on the PC can also be transferred to a Flash drive and then to the Tri-Phase's internal memory.

## **Computer Interface**

The Tri-Phase can be computer-controlled via the RS-232C or USB port using the included PC Software (Transformer Turns-Ratio Analyzer application provided with each Tri-Phase). This Windows® XP/Vista-based software can be used to run a test and to store test results on a PC. Test results can also be exported to Microsoft® Excel.

## **Thermal Printer**

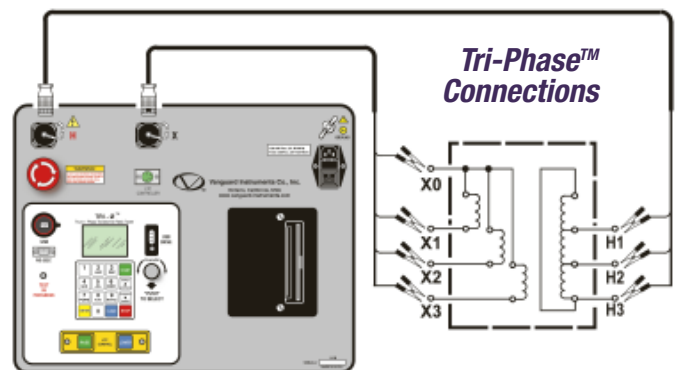
A built-in 4.5-inch wide thermal printer prints test results in a 14 point font for easy viewing. The printer and paper dispenser are mounted under the front panel for protection.

## **Transformer Load Tap Changer Control**

Transformer tap positions can be changed remotely using the unit's built-in transformer load tap changer. This remote-controlled tap changer feature eliminates the need to manually change the transformer's step-up and step-down taps.

## **Input Power Sources**

The Tri-Phase can be powered from a single-phase 100 – 240 Vac 50/60 Hz power source. A built-in safety ground detection circuit can detect and display any ground fault problems with the AC input source.



# Tri-Phase™

## **True Three-Phase Transformer Turns-Ratio Tester**

The Tri-Phase is a true three-phase transformer turns-ratio tester designed to conform to the IEEE C57.12.90 measurement standard. The Tri-Phase generates and outputs a three-phase excitation test voltage to the three transformer primary windings. The induced three-phase secondary voltages are sensed, and the transformer turns-ratio is calculated. The Tri-Phase can measure turns-ratios from 0.8 to 15,000. The three-phase turns-ratios, excitation current, and phase angle readings are displayed on the unit's LCD screen. Since a three-phase voltage is used to excite the transformer windings, the Tri-Phase can detect and measure turns-ratios of any transformer type, including phase-shifting transformers.

The Tri-Phase can be used as a stand-alone unit or can be computer-controlled. It can be operated locally using its alpha-numeric keypad and rotary switch. Information is displayed on a back-lit LCD screen (64 x 128 dot graphic) that is viewable in both bright sunlight and low-light levels. Test reports can be printed in the field on the unit's built-in 4.5-inch wide thermal printer.

The Tri-Phase can store up to 112 test records and 128 test plans in Flash EEPROM. Test records or test plans can be stored or transferred to and from a PC via the available interfaces (RS-232C port, USB port, USB Flash drive port).

## **Transformer Test Voltage**

The Tri-Phase generates three-phase transformer test voltages from a single-phase AC or DC power source. Three test voltages (8 Vac, 40 Vac, 100 Vac) allow the Tri-Phase to test CT's and PT's, as well as power transformers.

## **Auto-Detect Transformer Configuration**

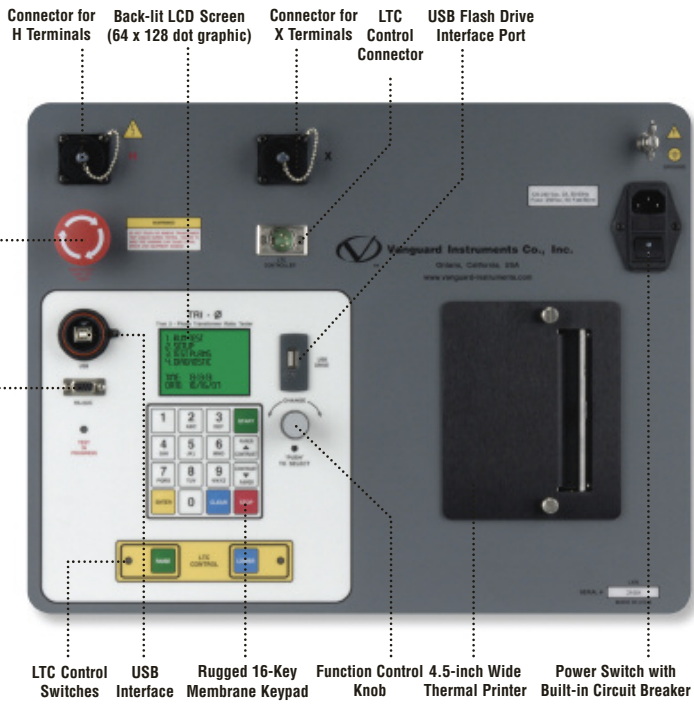
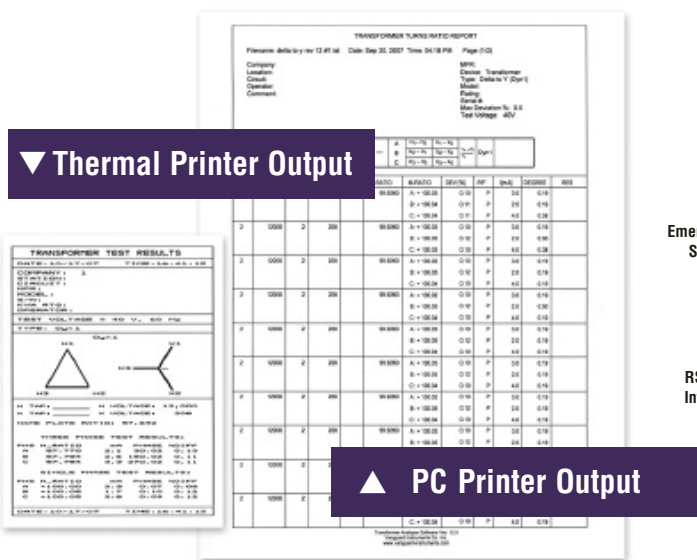
The Tri-Phase can automatically detect 130 different transformer types defined by ANSI, CEI/IEC, and Australian standards, as well as phase-shifting transformers.

## **User Interface**

The Tri-Phase features a back-lit LCD screen (64 x 128 dot graphic) that is viewable in both bright sunlight and low-light levels. The test results screen displays the transformer turns-ratio, excitation current, phase angle, and percentage error. The unit is controlled via a rugged, 16-key, membrane keypad and a digital rotary switch.

# 3-Phase Transformer Ratio

# the Tedious 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** True three-phase transformer turns-ratio tester
- PHYSICAL SPECIFICATIONS** 21"W x 9"H x 17"D (53 cm x 24 cm x 43 cm); Weight: 35 lbs (15.8 Kg)
- INPUT POWER** 3 amps, 100 – 240 Vac, 50/60 Hz
- MEASUREMENT METHOD** ANSI/IEEE C57.12.90
- URNS-RATIO MEASURING RANGE** 0.8 – 15,000 (5-digit resolution)
- URNS RATIO ACCURACY** 0.8 – 999: ±0.1%, 1000 – 1599: ±0.2%, 1600 – 9999: ±1%, 10,000 – 15,000: 1.5% @ 8 Vac  
 0.8 – 999: ±0.1%, 1000 – 1599: ±0.2%, 1600 – 9999: ±1%, 10,000 – 15,000: 1.5% @ 40 Vac  
 0.8 – 999: ±0.1%, 1000 – 1599: ±0.2%, 1600 – 9999: ±1%, 10,000 – 15,000: 1.5% @ 100 Vac
- TEST VOLTAGES** Three-phase, 8 Vac @ 1 Amp, 40 Vac @ 0.2 Amps, 100 Vac @ 0.1 Amp
- EXCITATION CURRENT READING RANGE** 0 – 2 Amperes; Accuracy: ±0.1 mA, ±2% of reading (±1 mA)
- PHASE ANGLE MEASUREMENT** 0 – 360 degrees; Accuracy: ± 0.2 degree (± 1 digit)
- DISPLAY** Back-lit LCD screen (64 x 128 dot graphic display); Viewable in bright sunlight and low-light levels
- PRINTER** Built-in 4.5-inch wide thermal printer
- EXTERNAL DATA STORAGE** One USB Flash drive interface port; Up to 999 transformer test records can be stored on a USB Flash drive (not included)
- COMPUTER INTERFACES** One RS-232C port, One USB port
- PC SOFTWARE** Windows® XP/Vista-based Transformer Turns-Ratio Analyzer application is included with purchase price
- INTERNAL TEST RECORD STORAGE** Stores up to 112 transformer test records. Each record holds the test record header and up to 33 readings
- INTERNAL TEST PLAN STORAGE** Stores up to 128 transformer test plans. Test plans can be transferred to the unit from the PC via the RS-232C/USB port or via the USB Flash drive interface
- LOAD TAP CHANGER CONTACT** 240 Vac, 1 Amp
- SAFETY** Designed to meet UL 61010A-1 and CAN/CSA C22.2 No. 1010.1-92 standards
- ENVIRONMENT** Operating: -10° to 50° C (15°F to +122° F); Storage: -30° C to 70° C (-22°F to +158° F)
- HUMIDITY** 90% RH @ 40°C (104°F) non-condensing
- ALTITUDE** 2,000m (6,562 ft) to full safety specifications
- CABLES** One 15-foot single-phase set, One 15-foot three-phase set, One 25- foot extension set, One ground cable, One USB cable, One RS-232C cable, power cord, cable bag
- OPTIONS** Transportation case
- WARRANTY** One year on parts and 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.



### **Vanguard Instruments Company, Inc.**

Vanguard Instruments Co., (VIC), was founded in 1991. Currently, our 28,000 square-foot facility houses Administration, Design & Engineering, and Manufacturing operations. From its inception, VIC's vision was, and is to develop and manufacture innovative test equipment for use in testing substation EHV circuit breakers and other electrical apparatus.

The first VIC product was a computerized circuit-breaker analyzer, which was a resounding success. It became the forerunner of an entire series of circuit-breaker test equipment. Since its beginning, VIC's product line has expanded to include microcomputer-based, precision micro-ohmmeters, single and three-phase transformer winding turns-ratio testers, winding-resistance meters, transformer tap-changing controllers, megaohm resistance meters, and a variety of other electrical utility maintenance support products.

VIC's performance-oriented products are well suited for the utility industry. They are rugged, reliable, accurate, user friendly, and most are computer controlled. Computer control, with innovative programming, provides many automated testing functions. VIC's instruments eliminate tedious and time-consuming operations, while providing fast, complex, test-result calculations. Errors are reduced and the need to memorize long sequences of procedural steps is eliminated. Every VIC instrument is competitively priced and is covered by a liberal warranty.

**Vanguard products are available from:**



**Vanguard Instruments Company, Inc.**

1520 S. Hellman Ave. • Ontario, California 91761 USA • P 909-923-9390 • F 909-923-9391  
[www.vanguard-instruments.com](http://www.vanguard-instruments.com)