ATRT-03 S2

automatic, 3-phase transformer turns ratio tester

Vanguard Instruments
A DOBLE COMPANY

doble®

ATRT-03 S2

3-phase transformer turns ratio tester

Product Overview

The ATRT-03 S2 can be used as a standalone 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 (128 x 64 pixels) 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 ATRT-03 S2 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 and from a PC via the available interfaces (RS-232C port, USB port, USB Flash drive port).

The ATRT-03 S2 is Vanguard's third generation, microprocessor-based, automatic, three phase, transformer turns-ratio tester. This lightweight and rugged portable unit is designed for transformer testing at utility power substations.

The ATRT-03 S2 determines the transformer turns-ratio using the IEEE C57.12.90 measurement method. The ATRT-03 S2 outputs an excitation test voltage to the transformer's primary windings. The induced secondary voltage is sensed and the transformer turns-ratio is calculated. The ATRT-03 S2 can measure turns-ratios from 0.8 to 15,000. The transformer turns-ratio, excitation current, and phase-angle readings are displayed on the large backlit LCD. The built-in transformer type detection feature allows the ATRT-03 S2 to detect and test 130 transformer types defined by ANSI, CEI/IEC and Australian standards.

Transformer Test Voltages

To prevent an accidental wrong test-lead hook-up (e.g., when the operator reverses H and X leads), the ATRT-03 S2 outputs a low-level test voltage to verify the hook-up condition before applying the full test voltage to the transformer. Three test voltages (8 Vac, 40 Vac, 100 Vac) allow the ATRT-03 S2 to test CT's and PT's, as well as power transformers.

Auto-Detect Transformer Configuration

The ATRT-03 S2 can automatically detect 130 specific vector groups for different transformer types defined by ANSI, CEI/IEC, and Australian standards.

Internal Test Record Storage

Up to 112 test records can be stored in the ATRT-03 S2's Flash EEPROM memory. Each test record may contain up to 99 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).

Power Sources

The ATRT-03 S2 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 a ground fault problem with the AC input source.

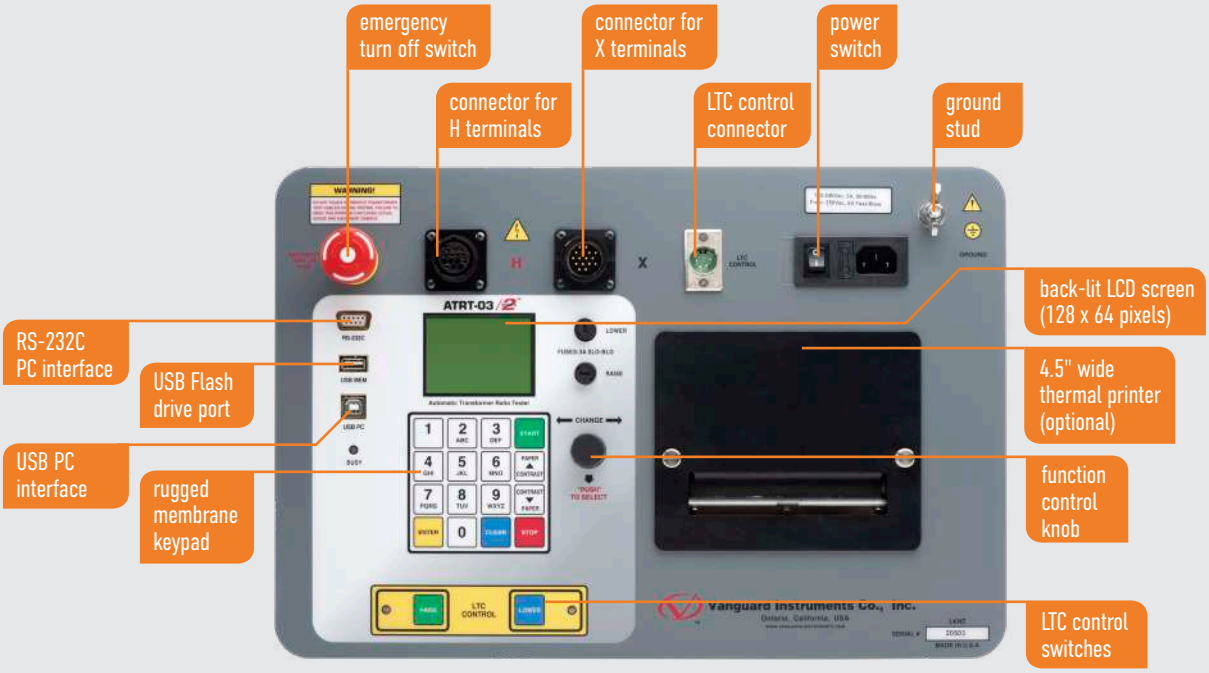
outstanding features

- Ratio range: 0.8 – 15,000 : 1
- Capable of detecting 130 different 3-phase transformer types defined by ANSI, IEC, and Australian standards
- 3 test voltages: 8Vac, 40Vac, and 100Vac
- Phase angle and excitation current measurement
- RS-232C and USB PC interfaces
- Optional 4.5" wide thermal printer

ordering information

Part No.	Description
9003-UC	ATRT-03 S2, cables, and PC software
9003-SC	ATRT-03 S2 shipping case
9003-PR	ATRT-03 S2 thermal printer option
TP4-CS	TP4 thermal printer paper (24 rolls)

ATRT-03 S2 Features



Transformer Test Plans

The ATRT-03 S2 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 to derive the percentage error and Pass/Fail results. By using 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 PC software and can be transferred to the ATRT-03 S2 via the available interfaces (RS-232C port, USB port, USB Flash drive port).

User Interface

The ATRT-03 S2 features a back-lit LCD screen (128 x 64 pixels) 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.

Computer Interface

In computer-controlled mode, the unit can be controlled via the RS-232C or USB interface using the included TTRA S2 transformer analysis software. This Windows®-based application can be used to run tests and to store test results on a PC. Test results can also be exported to Excel, PDF, and XML formats for further analysis.

Transformer Load Tap Changer Control

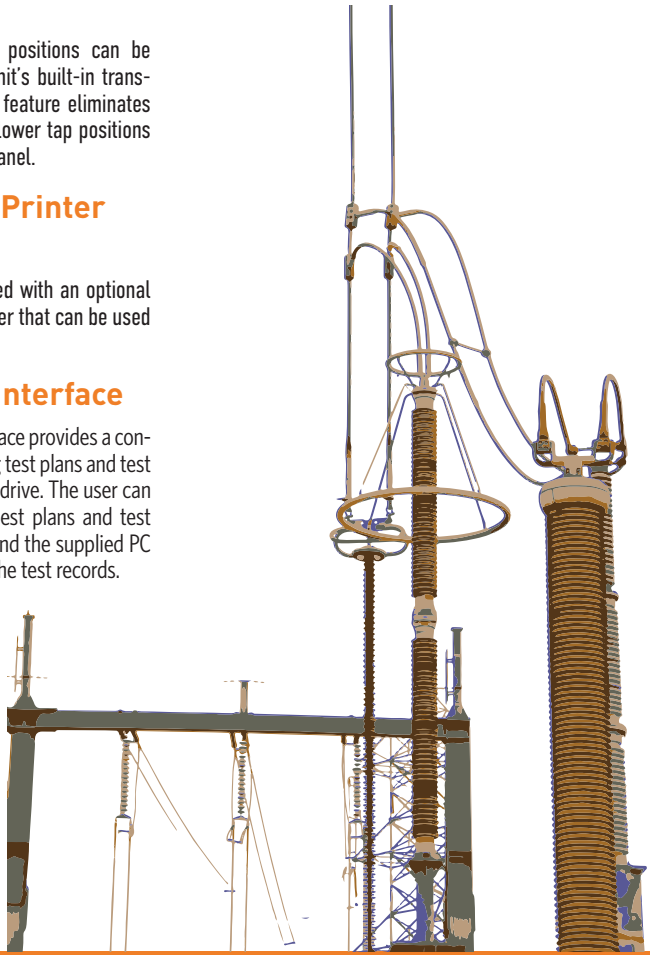
Voltage regulator or LTC tap positions can be changed remotely using the unit's built-in transformer load tap changer. This feature eliminates the need to manually raise or lower tap positions from the transformer control panel.

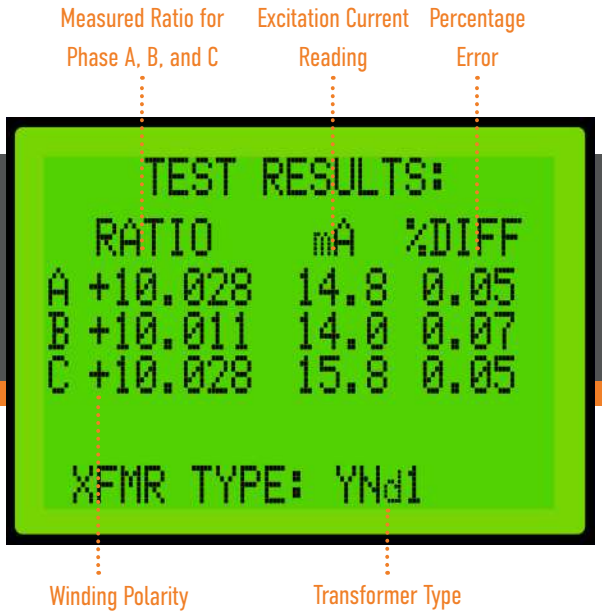
Built-in Thermal Printer Option

The ATRT-03 S2 can be outfitted with an optional built-in 4.5" wide thermal printer that can be used to print test results.

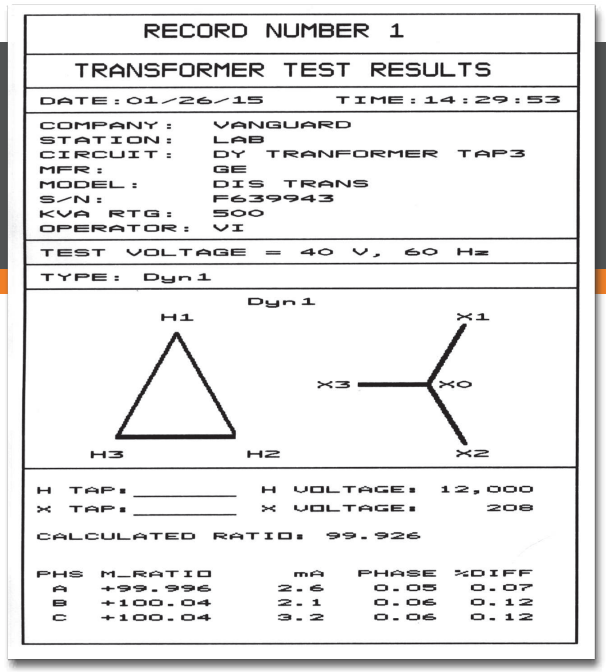
USB Flash Drive Interface

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. The user can store up to 999 transformer test plans and test records on a USB Flash drive, and the supplied PC software can be used to view the test records.





typical 3-phase test results screen



RECORD NUMBER 1

TRANSFORMER TEST RESULTS

DATE: 01/26/15 TIME: 14:29:53

COMPANY: VANGUARD
STATION: LAB
CIRCUIT: DY TRANFORMER TAP3
MFR: GE
MODEL: DIS TRANS
S/N: F639943
KVA RTG: 500
OPERATOR: VI

TEST VOLTAGE = 40 V, 60 Hz

TYPE: Dyn1

Dyn1

H1 X1 X3 X0 H3 H2 X2

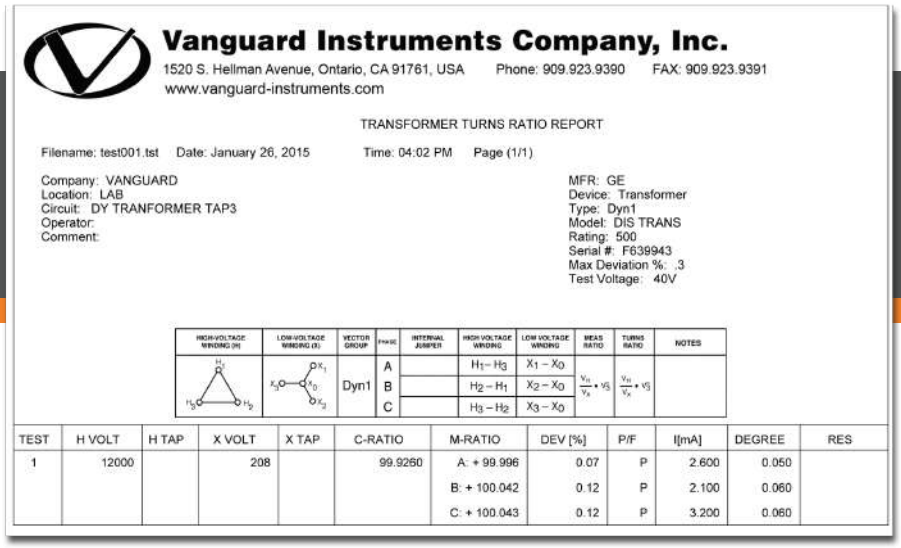
H TAP: _____ H VOLTAGE: 12,000
X TAP: _____ X VOLTAGE: 208

CALCULATED RATIO: 99.926

PHS	M_RATIO	mA	PHASE	%DIFF
A	+99.996	2.6	0.05	0.07
B	+100.04	2.1	0.06	0.12
C	+100.04	3.2	0.06	0.12

thermal printer output (printer optional)

With the built-in thermal printer option (part no. 9003-PR), test results can be quickly printed in the field without the need to connect the unit to a PC.



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TRANSFORMER TURNS RATIO REPORT

Filename: test001.tst Date: January 26, 2015 Time: 04:02 PM Page (1/1)

Company: VANGUARD
Location: LAB
Circuit: DY TRANFORMER TAP3
Operator:
Comment:

MFR: GE
Device: Transformer
Type: Dyn1
Model: DIS TRANS
Rating: 500
Serial #: F639943
Max Deviation %: .3
Test Voltage: 40V

HIGH-VOLTAGE WINDING (H)	LOW-VOLTAGE WINDING (X)	VECTOR GROUP	PHASE	INTERNAL JUMPER	HIGH-VOLTAGE WINDING	LOW-VOLTAGE WINDING	MEAS RATIO	TURNS RATIO	NOTES
		Dyn1	A		$H_1 - H_3$	$X_1 - X_0$	$\frac{V_H}{V_X} \cdot \sqrt{3}$	$\frac{V_H}{V_X} \cdot \sqrt{3}$	
			B		$H_2 - H_1$	$X_2 - X_0$			
			C		$H_3 - H_2$	$X_3 - X_0$			

TEST	H VOLT	H TAP	X VOLT	X TAP	C-RATIO	M-RATIO	DEV [%]	P/F	I[mA]	DEGREE	RES
1	12000		208		99.9260	A: + 99.996	0.07	P	2.600	0.050	
						B: + 100.042	0.12	P	2.100	0.060	
						C: + 100.043	0.12	P	3.200	0.060	

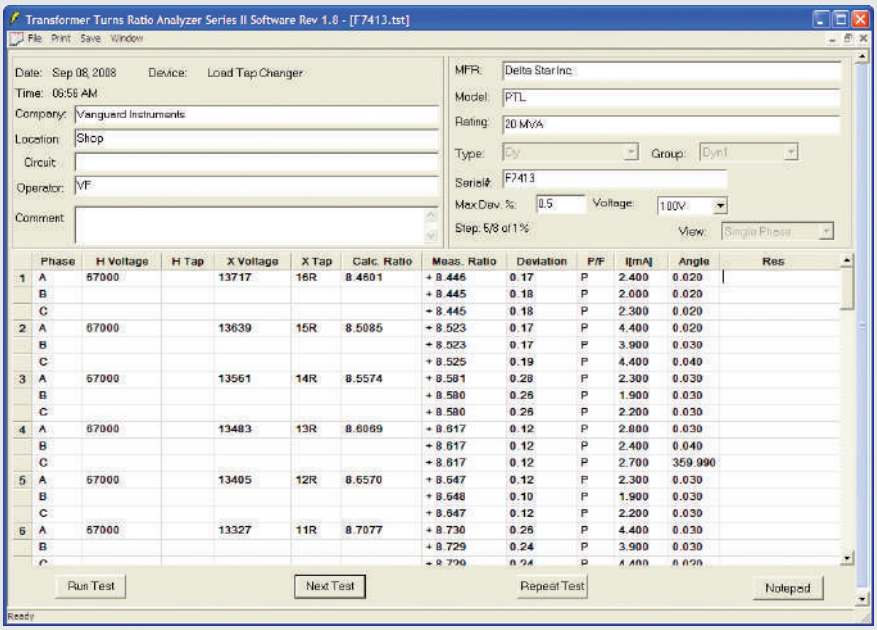
desktop printer output

Test reports can be generated with the included TTRA S2 PC software. Test records can be exported to Excel, PDF, and XML formats for further analysis.

TTRA S2 Software

The ATRT-03 S2 comes with the Vanguard Transformer Turns Ratio Analysis Series 2 (TTRA S2) PC software. The TTRA S2 software can be used to test winding turns ratios of transformers, voltage regulators, and load-tap changers. Test plans can be created using the TTRA S2 application and then transferred to the ATRT-03 S2. Test records can be exported to Excel, PDF, and XML formats for further analysis.

The latest version of the TTRA S2 software can always be downloaded free from the Vanguard web site at www.vanguard-instruments.com. Please note that you will need to create a free account on our site in order to download software or firmware.



ATRT-03 S2 technical specifications

physical specifications	**Dimensions:** 18"W x 7"H x 15" D (45.7 cm x 17.8 cm x 38.1 cm) **Weight:** 20 lbs. (9.0 Kg)
measuring method	ANSI/IEEE C57.12.90
typical turns-ratio accuracy	**8 Vac:** 0.8 – 1,000 (±0.08%), 1,001 – 4,000 (±0.1%), 4,001 – 15,000 (±0.25%) **40 Vac:** 0.8 – 1,000 (±0.05%), 1,001 – 4,000 (±0.1%), 4,001 – 15,000 (±0.2%) **100 Vac:** 0.8 – 1,000 (±0.05%), 1,001 – 4,000 (±0.1%), 4,001 – 15,000 (±0.2%)
test voltages	8 Vac @ 1.0A, 40 Vac @ 0.2A, 100 Vac @ 0.1A
display	back-lit LCD screen (128 x 64 pixels) viewable in bright sunlight and low-light levels
printer	optional built-in 4½" wide thermal printer
pc software	Windows®-based transformer turns-ratio analysis software is included with purchase
internal test record storage	stores 112 complete transformer test records, each record holding the test record header and up to 99 readings
safety	designed to meet IEC 61010 (1995), UL 61010A-1, and CSA-C22.2 standards
temperature	**Operating:** -10°C to +50°C (+15°F to +122°F) **Storage:** -30°C to +70°C (-22°F to +158°F)
cables	one 15 ft (4.6m) single phase set, one 15 ft (4.6m) 3-phase set, one 25 ft (7.6m) extension set, one safety ground, one RS-232C, one USB, cable bag
options	shipping case, 30' (9.14 m) 3-phase H and X leads, 30' (9.14 m) single phase H and X leads

input power	100 – 240 Vac, 50/60 Hz
ratio measuring range	0.8 – 15,000 : 1
current reading range	0 – 1 Ampere, accuracy: ±0.1mA, ±2% of reading (±1 mA)
phase angle measurement	0 – 360 degrees accuracy: ±0.2 degree (±1 digit)
computer interfaces	One RS-232C port, one USB port
internal test plan storage	stores up to 128 transformer test plans; plans can be transferred to PC.
external data storage	up to 999 test records on external USB flash drive (drive not included)
humidity	90% RH @ 40°C (104°F) non-condensing
altitude	2,000 m (6,562 ft) to full safety specifications
ltc contact	240 Vac, 2A
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.

Instruments designed and developed by the hearts and minds of utility electricians around the world.

Founded in 1991 and located in Ontario, California, USA, Vanguard Instruments™ offers a wide range of diagnostic test equipment that accurately and efficiently measures the health of critical substation equipment, such as transformers, circuit breakers, and protective relays.

Our first product was a computerized, extra high voltage (EHV) circuit breaker analyzer, which became the forerunner of an entire line of EHV circuit breaker test equipment. Over the years, our portfolio has grown tremendously to include microcomputer-based precision micro-ohmmeters; single- and three-phase transformer winding turns-ratio testers; transformer winding-resistance meters; mega-ohm resistance meters; and a variety of other application-specific products.

Our instruments are rugged, reliable, accurate, and user friendly. They eliminate tedious and time-consuming operations, while providing fast, complex test-result calculations. Using our equipment helps reduce errors and eliminates the need to memorize long sequences of procedural steps.

In 2017, Vanguard Instruments became a part of Doble Engineering Company, an energy industry leader in hardware, software, and services that diagnose and monitor the health of critical assets.

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