

EZCT-2000C Plus

current transformer test set



Vanguard Instruments Company, Inc.
www.vanguard-instruments.com

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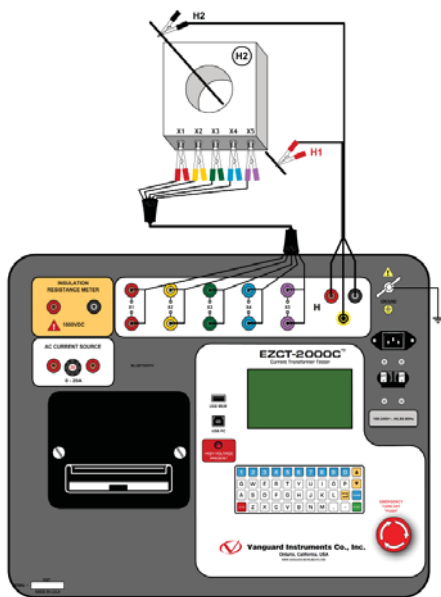


The EZCT-2000C Plus is Vanguard's third-generation microprocessor-based current transformer test set. Designed specifically for CT testing, the EZCT-2000C Plus has the following outstanding features that can greatly increase productivity and save time during the commissioning stage:

- Performs CT excitation, current-ratio, polarity, and phase angle tests
- Measures insulation resistance and winding resistance of the CT secondary windings
- Measures the CT's load burden
- Standalone or computer-controlled via USB or Bluetooth wireless interface

The EZCT-2000C Plus' test leads can be connected to all the CT output terminals, and the complete CT test can be performed automatically without any operator intervention.

EZCT-2000C Plus connections



Excitation Test

The CT excitation test is performed using the ANSI/IEEE C57.13.1 test method. Test voltage ranges from 50, 300, 500, 1200 and 2000 Vac can be selected for the excitation test. The test voltage is raised and lowered automatically by the EZCT-2000C Plus. The excitation test voltage and current data is collected and stored in the unit's internal memory. Knee point voltages (ANSI 10/50, IEC 60044, IEEE-30, IEEE-45) are calculated and printed on the test report. All of the test leads can be connected to the CT output terminals (X1, X2, X3, X4 and X5), and there is no lead switching required during testing. This convenient arrangement allows for testing any of the 10 possible combinations of X1 to X5. Up to 10 excitation tests can be stored in one record. Once the test is completed, the test report and CT excitation curves can be printed on the built-in thermal printer.

Demagnetization

The EZCT-2000C Plus automatically demagnetizes the CT under test when performing an excitation test.

Winding Resistance Test

The EZCT-2000C Plus can measure the DC resistance of transformer windings from 100 micro-ohms to 10 ohms.

CT Winding Insulation Resistance Test Feature

The EZCT-2000C Plus offers an IR test feature that can also measure the insulation resistance of the CT's secondary winding using a test voltage up to 1000 Vdc. The DC winding resistance reading range is from 2 to 500 Mega-ohms. The insulation resistance test results are displayed and printed on the report.

Ratio and Polarity Tests

The CT current-ratio is determined using the ANSI/IEEE C57.12.90 measurement method. A test voltage is applied on any two terminals (X1 to X5) of the CT, and the induced voltage is measured through the H1 and H2 terminals of the CT. The CT current-ratio is displayed and also stored in memory. The current-ratio is measured from 0.8 to 5,000. The CT winding polarity is displayed as a "+" sign (in-phase) or a "-" sign (out-of-phase) and is annotated with the phase angle in degrees. The CT current ratio error and phase displacement is also calculated based on the CT burden (or rated power) and rated current.

CT Burden Test

The EZCT-2000C Plus can measure the CT's actual connected burden by injecting a 1A or 5A test current into the load. The CT burden measurements (Voltage, current, Cos ϕ , and burden impedance) are displayed on the screen and printed on the test report. This important test verifies the actual CT measured burden before putting the CT in service, thus avoiding any potential configuration conflicts.

ordering information

Part number **9101-UC** 110V EZCT-2000C Plus, cables, and PC software

Part number **9102-UC** 220V EZCT-2000C Plus, cables, and PC software

Part number **9019-SC**

Part number **TP4-CS**

EZCT-2000C Plus Shipping Case

TP4 thermal printer paper (24 rolls)

EZCT-2000C Plus Controls & Indicators



Current Ratio and Phase Error Tables

As part of the tabulated test results, the EZCT-2000C Plus can also print the current ratio and current phase error tables.

Current Source

The EZCT-2000C Plus offers a programmable current source (0-20A, 0-15Vac) that can be used to verify CT loads. The on-time timer and output current are displayed on the LCD screen.

Test Record Header Information

Test record header information, including the company, substation name, circuit ID, manufacturer, mode, CT serial number, and the operator's name, can be stored with each record. In addition to the test record header, a 20-character test description for each test in the record (10 tests per record) can also be entered.

User Interface and Display

The EZCT-2000C Plus features a back-lit LCD screen (240 x 128 pixels) that is clearly viewable in both bright sunlight and low-light levels. A "QWERTY"-style membrane keypad is used to enter test information and to control the unit's functions.

Thermal Printer

A 4.5-inch wide built-in thermal printer can print the CT test results and excitation curves.

Computer Interface

The EZCT-2000C Plus can be used as a stand-alone unit or can be computer-controlled. It can be connected to a PC via the USB port or wirelessly via Bluetooth. In computer-controlled mode, using the included CT Analysis Software, test records can be downloaded from the unit's memory, or CT tests can be run from the PC. Test plans can also be created with the provided software. A test plan defines the various test parameters (test voltage, current range, nameplate ratios, etc.) and can be used to quickly perform tests. Additionally, tabulated test records are automatically exported to PDF, Excel, and XML formats for further analysis.

Internal Test Record Storage

The EZCT-2000C Plus can store up to 140 test records in Flash EEPROM. Each record may contain up to 10 excitation curves, burden test reports, current ratio readings, and polarity and DC resistance readings. Test records can be recalled and printed on the built-in thermal printer. They can also be transferred to a PC using the USB port, wirelessly via Bluetooth, or via the USB Flash drive interface port.

Internal Test Plan Storage

The EZCT-2000C Plus can store up to 128 CT test plans in Flash EEPROM. A test plan is comprised of the excitation test voltage, current range selection, CT nameplate ratios, and CT winding terminal combinations (X1 to X5) for each test and also includes the insulation test definition. Up to 10 test definitions can be stored per test plan. The ability to store test plans makes CT testing an extremely simple process. To perform a test, the EZCT-2000C Plus is connected to the CT terminals and a test plan is selected to run.

Creating test plans for the EZCT-2000C Plus is also a simple process. A test plan can be created using the EZCT-2000C's keypad or can be created on a PC (with provided software) and then downloaded to the EZCT-2000C via the USB port or Bluetooth. For added convenience, test plans can also be copied from a USB Flash drive to the EZCT-2000C via the USB Flash drive interface.

External Data Storage

The EZCT-2000C Plus features a USB Flash drive interface that makes it very convenient to store and transfer test records and test plans. By using a USB Flash drive, test records and test plans can be quickly transferred between a computer and the EZCT-2000C Plus without the need to connect the unit to the computer.

EZCT-2000C Plus thermal printer output

RECORD NUMBER 1

CT EXCITATION TEST RESULTS

DATE: 05/07/12 TIME: 10:04:09

COMPANY:
STATION:
CIRCUIT:
MFR:
MODEL:
S/N:
COMMENTS:
OPERATOR:

TEST NUMBER: 1

TESTED TAP: X1-X2

TST NOTE:

TEST VTG RANGE: 300 V
TEST CUR RANGE: 2.0 A

WINDING RES: 212.1 m-OHMS

IEC 10/50 V_{kp}: 213.6 VOLTS
IEC 10/50 I_{kp}: 0.0858 AMPS

IEEE 30% V_{kp}: 198.0 VOLTS
IEEE 30% I_{kp}: 0.0736 AMPS

IEEE 45% V_{kp}: 165.7 VOLTS
IEEE 45% I_{kp}: 0.0586 AMPS

NAME PLATE RATIO: 1000:5
MEASURED RATIO: 199.97
PERCENT ERROR: 0.02 %
POLARITY: IN PHASE
PHASE ANGLE: 0.04°
EXCITATION VTG: 98.2 VOLTS
EXCITATION CUR: 0.0368 AMPS

CURRENT RATIO ERROR TABLE

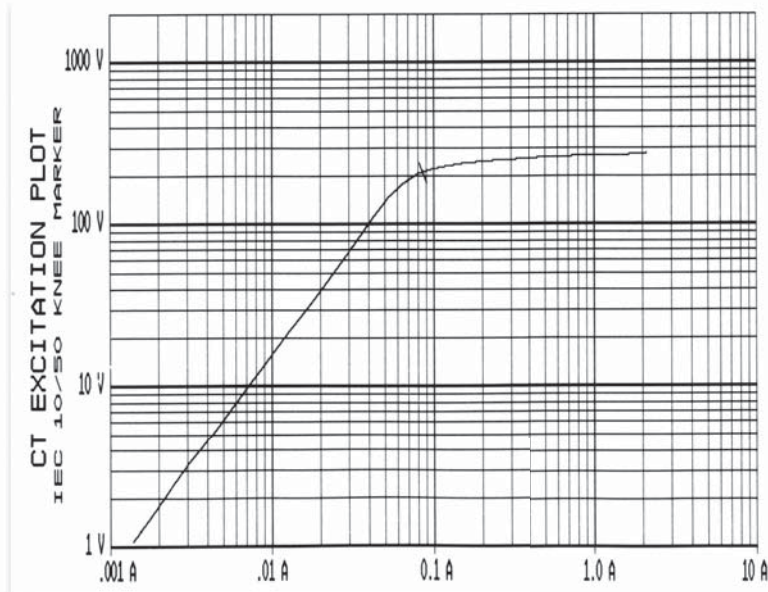
BURDEN	PERCENT RATED CURRENT (5.0 A)	5%	10%	20%	40%
10.00 / 1.00		-0.05%	-0.05%	-0.04%	-0.04%
5.00 / 1.00		-0.035%	-0.035%	-0.03%	-0.03%
2.50 / 1.00		-0.02%	-0.02%	-0.02%	-0.02%
1.25 / 1.00		-0.02%	-0.02%	-0.02%	-0.02%
0.00 / 1.00		-0.02%	-0.02%	-0.02%	-0.02%

UA / COS φ	50%	100%	120%	200%
10.00 / 1.00	-0.04%	-0.04%	-0.04%	-0.03%
5.00 / 1.00	-0.03%	-0.03%	-0.03%	-0.02%
2.50 / 1.00	-0.02%	-0.02%	-0.02%	-0.02%
1.25 / 1.00	-0.02%	-0.02%	-0.02%	-0.02%
0.00 / 1.00	-0.02%	-0.01%	-0.01%	-0.01%

CURRENT PHASE ERROR TABLE
(PHASE ERROR IN MINUTES)

BURDEN	PERCENT RATED CURRENT (5.0 A)	5%	10%	20%	40%
10.00 / 1.00		3.19*	3.20*	2.68	2.13
5.00 / 1.00		2.16*	2.15*	2.10	1.66
2.50 / 1.00		1.63*	1.63*	1.63*	1.35
1.25 / 1.00		1.38*	1.37*	1.37*	1.24
0.00 / 1.00		1.11*	1.11*	1.11*	1.09

UA / COS φ	50%	100%	120%	200%
10.00 / 1.00	1.98	1.81	1.44	1.23
5.00 / 1.00	1.52	1.19	1.10	0.95
2.50 / 1.00	1.28	1.00	0.94	0.76
1.25 / 1.00	1.12	0.89	0.84	0.68
0.00 / 1.00	1.00	0.77	0.73	0.61



BURDEN TEST RESULTS

5 AMP BURDEN TEST

MEAS CURRENT: 4.979 A
MEAS VOLTAGE: 5.371 V, 359.2°
IMPEDANCE (Z): 1.079 OHMS

BURDEN: 26.959 VA
COS φ: 1.00

INSULATION RES TEST RESULTS

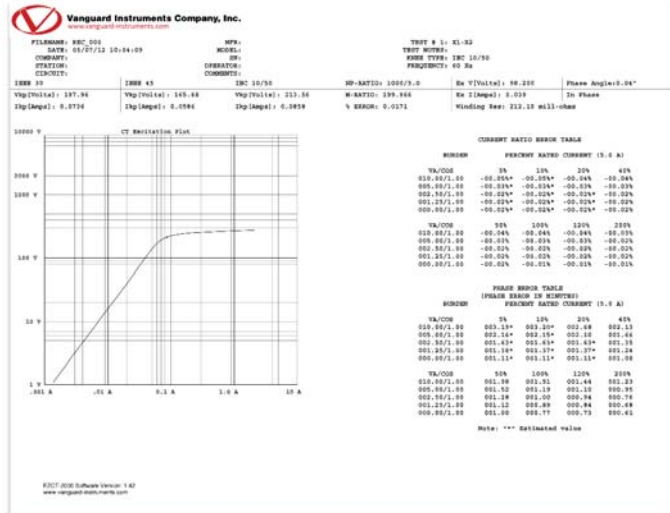
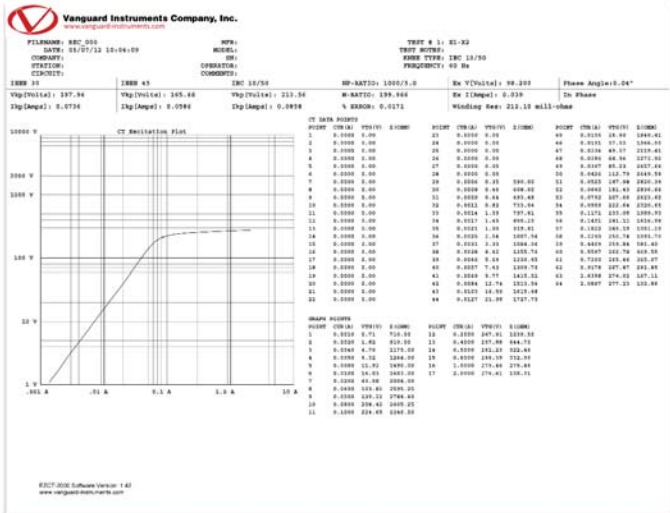
1000V INSULATION RES TEST

VOLTAGE: 997.7 V
CURRENT: 9.85 MICRO-AMPS
RESISTANCE: 101.27 MEG-OHMS

..... typical burden test results

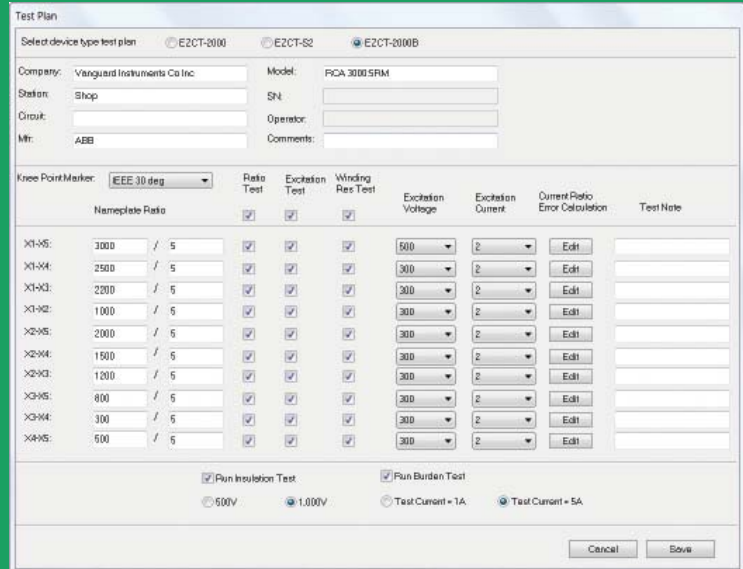
..... typical insulation resistance test results

EZCT-2000C Plus desktop printer output



Computer control and analysis with included EZCT-2000 Software

The EZCT-2000C Plus comes with the Vanguard EZCT-2000 PC software. The EZCT-2000 software can be used to test a current transformer directly from a PC, create and transfer test plans, retrieve test records from the EZCT-2000C Plus, and export test records in Excel format for further analysis.



EZCT-2000C Plus specifications

type	Portable current transformer test set
physical specifications	19"W x 13"H x 16"D (48.3 cm x 33cm x 40.1 cm); Weight: 73 lbs (33.1 kg)
input power	100 – 120 Vac or 200 – 240 Vac (factory pre-set), 50/60 Hz
measurement method	ANSI/IEEE C57.12.90 and ANSI/IEEE C57.13.1 standards
output test voltages	0 – 50 Vac @ 10A max; 0 – 300 Vac @ 10A max; 0 – 500 Vac @ 5A max; 0 – 1200 Vac @ 1.2A max; 0 – 2000 Vac @ 1A max
current source	1 – 20A @ 0 – 15 Vac
current source display	Test current and current on-time
voltage reading range	0 – 2,200 Vac; Accuracy: ±1.0% of reading, ±1 volt
current reading range	0 – 10A; Accuracy: ±1.0% of reading, ±0.02A
current ratio range	0.8 – 999: 0.1%, 1000 – 1999: 0.3%, 2000 – 5000: 1%
phase angle measurement	0 – 360 degrees; Accuracy: ±1.0 degree
resistance reading range	100 micro-ohms – 10 ohms; Accuracy: 2% of reading, ±1 count, ±10 micro-ohms
insulation resistance test feature	2 Mega-ohms – 500 Mega-ohms; Accuracy: 3% of reading, 500 – 1000 Vdc test voltage
display	Backlit LCD Screen (240 x 128 pixels; 114mm x 64mm); viewable in bright sunlight and low-light levels
printer	Built-in 4.5-inch wide thermal printer
computer interfaces	One USB port and Bluetooth wireless interface
external data storage	One USB Flash drive interface port (Flash drive not included)
pc software	Windows®-based CT Analysis software is included with purchase price
internal test record storage	Stores 140 test records. Each test record may contain up to 10 sets of excitation, resistance and ratio data
internal test plan storage	Stores 128 test plans. Each test plan can store 10 excitation test voltage and current settings
safety	Designed to meet UL 61010A-1 and CAN/CSA C22.2 No. 1010.1-92 standards
environment	Operating: -10°C 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	2,000 m (6,562 ft) to full safety specifications
cables	One 20-foot cable set (X1-X5), one 35-foot H cable set, current source cables, insulation test cables, power cord, ground cable. A transportation case is included with the purchase price
warranty	One year on parts and labor

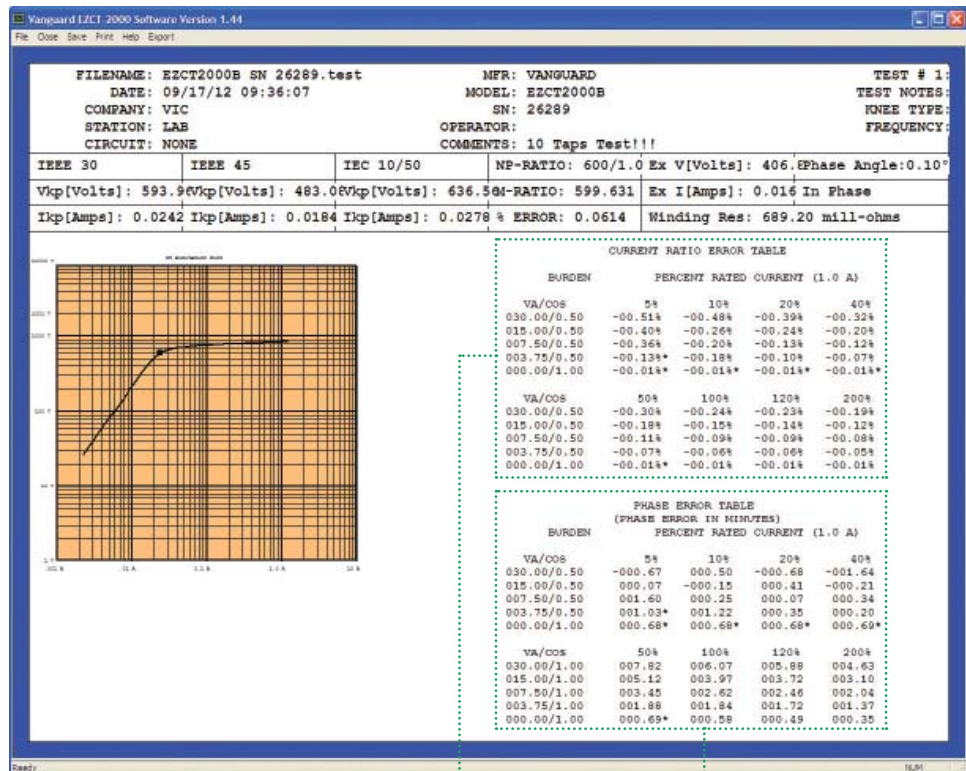
NOTE : the above specifications are valid at nominal voltage and ambient temperature of +25°C (+77°F). Specifications are subject to change without notice.

EZCT-2000 PC Software

The EZCT-2000 Windows®-based software is included with all compatible Vanguard Current Transformer Testers (EZCT S2A, EZCT-2000A, EZCT-2000B, EZCT-2000C) at no additional cost. This robust application can be used to control the current transformer tester from a PC to perform tests. It can also be used to retrieve test records from the current transformer tester, analyze test records, and view test results in tabulated and graphical format. Current transformer test plans can also be created and transferred to the current transformer tester.

Retrieving and Analyzing Test Records

The EZCT software can be used to quickly retrieve test records from a compatible Vanguard current transformer tester. Test results can be viewed in tabular and graphical format and can be saved on the PC hard drive.



Current Ratio Error Table

Phase Error Table

Test record header information, such as the company name, station, circuit, operator name, manufacturer, model, and serial number can also be edited.

Company: FPL Model: TCA2 2000M1 Select tap and then press up or down to change order.

Station: 1165 1F SN: 080F495 31

Circuit: FACE C TC 6 Operator: FASF

Mfr: CORE Comments:

Knee Point Marker: IEC 10/50 Frequency: 60 Hz Notepad

Nameplate Ratio: X1-X2 1000 / 5.0 Ratio Test: Excitation Test: Winding Res Test: Excitation Voltage: 300 Excitation Current: 1 Current Ratio Error Calculation: Edit Test Note: Repeat Test:

Run Insulation Test Run Burden Test Save to Test Plan Repeat Tests Cancel OK

Test Record Details

Vanguard EZCT-2000 Software Version 1.44

File Close Save Print Help Export

FILENAME: EZCT2000B SN 26289.test **MFR:** VANGUARD **SUMMARY REPORT**
DATE: 09/17/12 09:36:07 **MODEL:** EZCT2000B **KNEE TYPE:** IEEE 30 Deg
COMPANY: VIC **SN:** 26289 **FREQUENCY:** 60 Hz
STATION: LAB **OPERATOR:** **COMMENTS:** 10 Taps Test!!!
CIRCUIT: NONE

Test	Tap	IEEE30	IEEE45	IEC 10/50	NP-Ratio	M-Ratio	% Error	Phase Angle	Winding Res
1	X1-X2	197.36	165.40	212.16	200/1.0	199.925	0.0375 %	0.02°	215.70 m-ohms
2	X1-X3	434.16	364.72	467.52	440/1.0	439.896	0.0235 %	-0.02°	490.69 m-ohms
3	X1-X4	495.36	405.16	536.20	500/1.0	499.739	0.0522 %	0.00°	564.43 m-ohms
4	X1-X5	593.96	483.08	636.56	600/1.0	599.631	0.0614 %	0.10°	689.20 m-ohms
5	X2-X3	236.56	197.76	255.00	240/1.0	239.907	0.0387 %	0.00°	275.74 m-ohms
6	X2-X4	298.64	242.00	319.36	300/1.0	299.857	0.0477 %	0.04°	349.53 m-ohms
7	X2-X5	394.12	322.52	429.04	400/1.0	399.887	0.0283 %	-0.04°	474.44 m-ohms
8	X3-X4	59.32	50.00	63.84	60/1.0	59.995	0.0092 %	-0.02°	74.55 m-ohms
9	X3-X5	156.32	132.28	169.16	160/1.0	159.966	0.0215 %	0.00°	199.52 m-ohms
10	X4-X5	98.48	81.68	106.88	100/1.0	99.976	0.0243 %	0.00°	125.28 m-ohms

1000V V
2000 V
5000 V
100 V
10 V
1 A
0.1 A
0.01 A

CT Excitation Plot

(Double click to edit file)

1000V INSULATION RES TEST RESULTS

VOLTAGE: 999.2 V
CURRENT: 9.95 MICRO-AMPS
RESISTANCE: 100.41 MEG-OHMS

BURDEN TEST RESULTS

5 AMP BURDEN TEST

MEASURED CURRENT: 4.993 A
MEASURED VOLTAGE: 5.270 V, 359.87 DEG
IMPEDANCE (Z): 1.055 OHMS
BURDEN: 26.366 VA
POWER FACTOR: 1.00

Test Notepad

Ready

Insulation Resistance Test Results

Burden Test Results

Creating Test Plans for Faster Testing

The EZCT-2000 software can be used to create current transformer test plans. Test plans can then be run from the PC or transferred to the CT Tester to be run from the CT Tester. Test plans can also be retrieved from a CT Tester using the EZCT-2000 software.

Test Plan

Select device type test plan: EZCT-2000 EZCT-S2 EZCT-2000B

Company: Model:
 Station: SN:
 Circuit: Operator:
 Mfr: Comments:

Knee Point Marker: IEEE 30 deg

Nameplate Ratio	Ratio Test	Excitation Test	Winding Res Test	Excitation Voltage	Excitation Current	Current Ratio Error Calculation	Test Note
X1-X5: <input type="text"/> / <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	50	0.2	<input type="button" value="Edit"/>	<input type="text"/>
X1-X4: <input type="text"/> / <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	50	0.2	<input type="button" value="Edit"/>	<input type="text"/>
X1-X3: <input type="text"/> / <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	50	0.2	<input type="button" value="Edit"/>	<input type="text"/>
X1-X2: <input type="text"/> / <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	50	0.2	<input type="button" value="Edit"/>	<input type="text"/>
X2-X5: <input type="text"/> / <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	50	0.2	<input type="button" value="Edit"/>	<input type="text"/>
X2-X4: <input type="text"/> / <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	50	0.2	<input type="button" value="Edit"/>	<input type="text"/>
X2-X3: <input type="text"/> / <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	50	0.2	<input type="button" value="Edit"/>	<input type="text"/>
X3-X5: <input type="text"/> / <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	50	0.2	<input type="button" value="Edit"/>	<input type="text"/>
X3-X4: <input type="text"/> / <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	50	0.2	<input type="button" value="Edit"/>	<input type="text"/>
X4-X5: <input type="text"/> / <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	50	0.2	<input type="button" value="Edit"/>	<input type="text"/>

Run Insulation Test Run Burden Test
 500V 1,000V Test Current = 1A Test Current = 5A



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

Vanguard Instruments Company, (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 circuitbreaker analyzer, which was a resounding success. It became the forerunner of an entire series of circuitbreaker 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, transformer winding-resistance meters, mega-ohm 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.



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