EZCT-2000B™

Current Transformer Test Set

Vanguard Instruments Company

Simplify

EZCT-2000B™

Current-Transformer Testing Made Easy

The EZCT-2000B is Vanguard's third-generation microprocessor-based current transformer test set. Designed specifically for CT testing, the EZCT-2000B 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 secondary burden

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

Saturation Test

The CT saturation 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 saturation test. The test voltage is raised and lowered automatically by the EZCT-2000B. The saturation test voltage and current data is collected and stored in the EZCT-2000B'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 EZCT-2000B's 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 saturation 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.

CT Ratio and Polarity Test

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 Winding Resistance Test

The EZCT-2000B can measure the DC resistance of the CT winding under test. The DC winding resistance reading range is from 100 micro-ohms to 10 Ohms. Equivalent winding resistance values at different temperatures are also provided in the report.

CT Winding Insulation Resistance Test

The EZCT-2000B 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.

CT Burden Test

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

Current Source

The EZCT-2000B's programmable current source (0-20A, 0-15Vac) 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-2000B features a back-lit LCD screen (128 x 64 dot graphic) that is clearly viewable in both bright sunlight and low-light levels. An alpha-numeric 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 saturation curves.

Internal Test Record Storage Capacity

The EZCT-2000B can store up to 140 test records in Flash EEPROM. Each test record may contain up to 10 saturation curves, burden test reports, current ratio readings, and polarity and DC resistance readings. Test records can be recalled and printed by the built-in thermal printer. Test records can also be transferred to a PC using the RS-232C port, USB port, or via the USB Flash drive interface port.

Current-Transformer Test Set

the Tedious Procedure of Current-Transformer Testing with Vanguard's EZCT-2000B™ Current Transformer Test Set

Test Plan Storage Capacity

The EZCT-2000B can store up to 128 CT test plans in Flash EEPROM. A test plan is comprised of the saturation 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-2000B is connected to the CT terminals and a test plan is selected to run.

Creating test plans for the EZCT-2000B is also a simple process. A test plan can be created using the EZCT-2000B's keypad or can be created on a PC (with provided software) and then downloaded to the EZCT-2000B via the RS-232C or USB ports. For added convenience, test plans can also be copied from a USB Flash drive to the EZCT-2000B via the USB Flash drive interface.

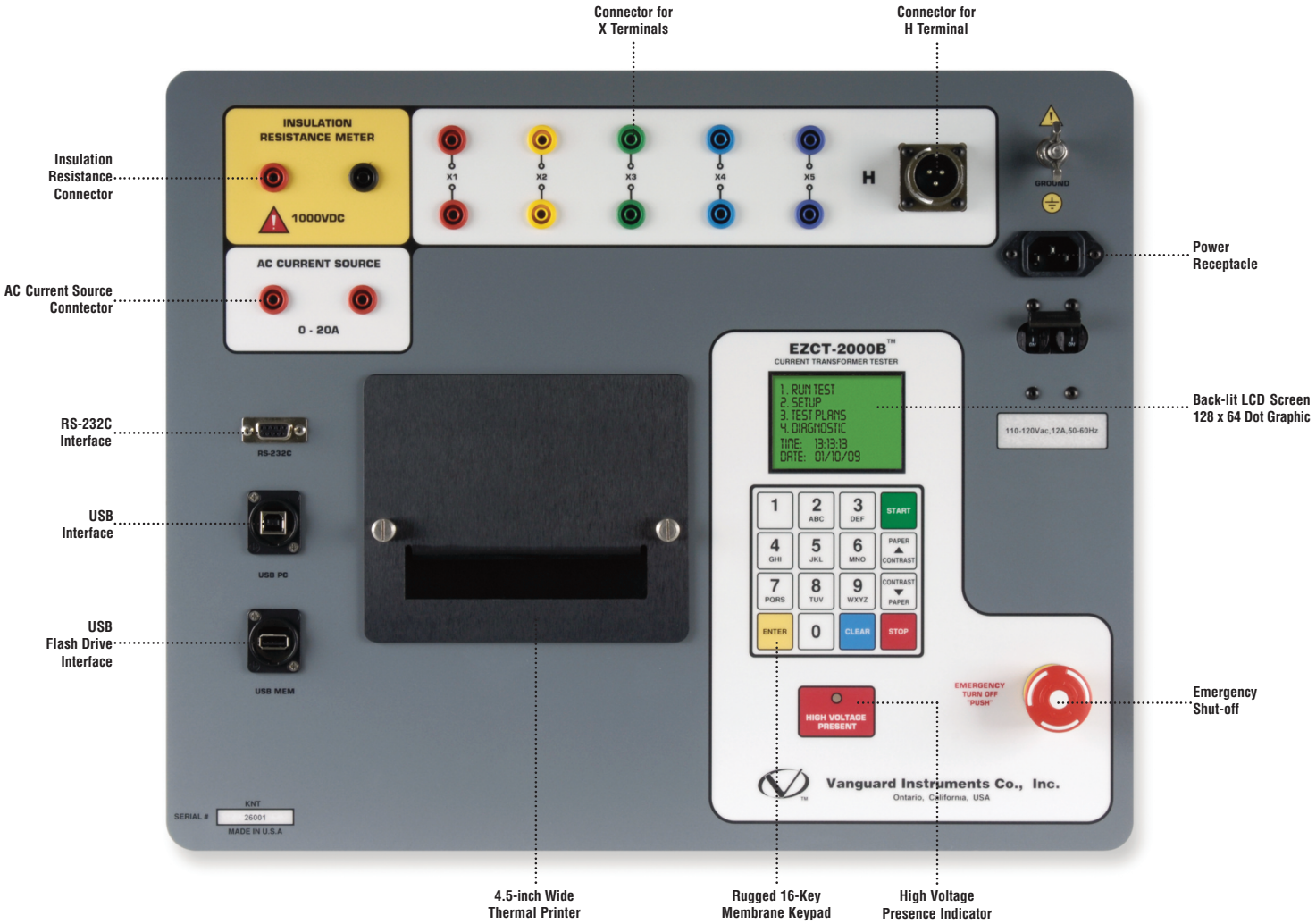
Computer Interface

The EZCT-2000B can be used as a stand-alone unit or can be computer-controlled. It can be connected to a PC via the standard RS-232C or USB port. In computer-controlled mode, test records can be downloaded from the EZCT-2000B's memory, or CT tests can be run from the PC. A Windows® XP/Vista-based Current Transformer Analysis software application is provided with the EZCT-2000B and can be used to transfer test records from the EZCT-2000B to a PC. Test plans can also be created with the provided software. Additionally, tabulated test records can be exported to Microsoft® Excel®.

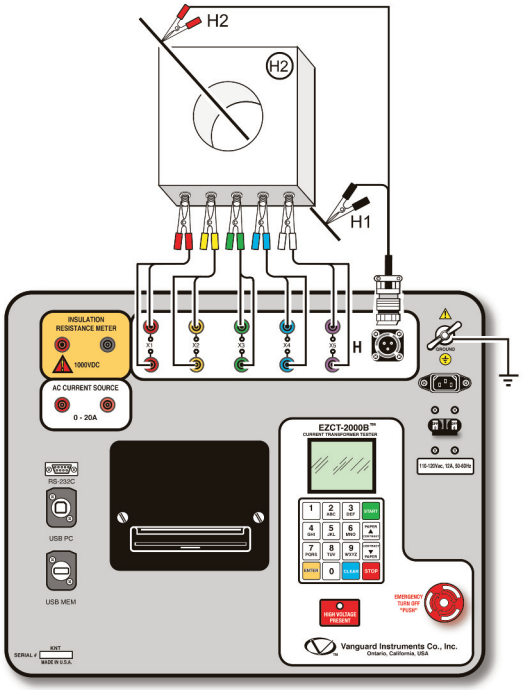
Ordering Information

EZCT 2000B™ Current-Transformer Test Set

EZCT 2000B™, Cable, Software	Part No: EZCT-2000B
EZCT 2000B™ Shipping Case	Part No: EZCT-2000B Case
4.5-inch Printer Paper	Part No: Paper TP4



Current-Transformer Testing Made Easy



EZCT 2000B Connections

Thermal Printer Output ▶

```
BURDEN TEST RESULTS
DATE: 01/19/09          TIME: 12:33:18
COMPANY:
STATION:
CIRCUIT:
MFR:
MODEL:
S/N:
COMMENTS:
OPERATOR:

INSULATION RESISTANCE TEST

TEST VOLTAGE = 500 VDC
RESISTANCE =   40.0 MEG OHMS

5 AMP BURDEN TEST

MEAS CURRENT:      5.002 A
MEAS VOLTAGE:      2.983 V, 23.1°
IMPEDANCE (Z):     0.60 OHMS

BURDEN:            15.02 VA
COS φ:             0.92
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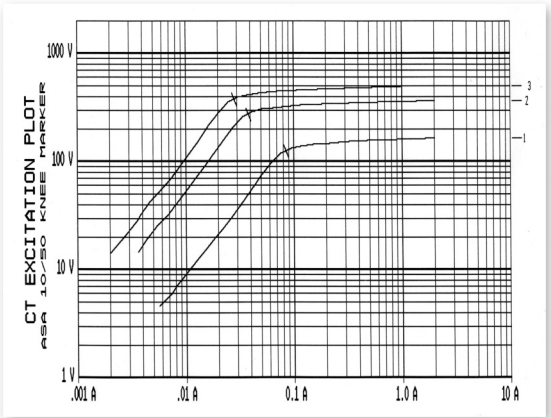



```
CT EXCITATION TEST RESULTS
DATE:01/30/09          TIME:13:13:56
COMPANY:
STATION:
CIRCUIT:
MFR:
MODEL:
S/N:
COMMENTS:
OPERATOR:

TESTED TAP: X1-X2
TST NOTE:

CT DATA POINTS
        CUR (A)  VTG (V)    Z (OHMS)/DEG
# 1      0.0196      0.8      38.8  56.6
# 2      0.0206      0.8      38.8  56.6
# 3      0.0254      1.0      40.9  55.1
# 4      0.0314      1.4      43.2  53.6
# 5      0.0378      1.7      45.5  52.7
# 6      0.0468      2.9      49.4  50.9
# 7      0.0576      3.1      53.5  49.1
# 8      0.0698      4.0      56.7  47.0
# 9      0.0856      5.2      60.3  44.8
#10      0.1070      7.2      67.3  41.6
#11      0.1310      9.5      72.4  39.1
#12      0.1606     12.6      78.7  35.2
#13      0.2006     16.9      84.1  32.3
#14      0.2400     21.1      87.8  31.0
#15      0.2934     26.0      88.5  30.9
#16      0.3656     30.5      83.5  32.5
#17      0.4416     33.2      75.3  34.3
#18      0.5440     35.6      65.4  39.9
#19      0.6644     37.0      55.7  43.6
#20      0.8236     38.2      45.4  47.3
#21      1.0020     39.1      39.0  51.6

TABULATED GRAPH POINTS
    CUR (A)  VTG (V)    Z (OHMS)
     0.0010      0.0        40.0
     0.0020      0.1        40.0
     0.0040      0.2        40.0
     0.0050      0.2        40.0
     0.0080      0.3        40.0
     0.0100      0.4        40.0
     0.0200      0.8        39.0
     0.0400      1.9        47.0
     0.0500      2.4        51.0
     0.0800      3.7        59.0
     0.1000      4.5        65.2
     0.2000     12.8        64.0
     0.4000     31.8        79.4
     0.5000     34.6        69.1
     0.8000     38.0        47.5
     1.0000     39.1        39.1

WINDING RES =   74.33 m-OHMS

ASA 10/50 Vkp:          33.7 VOLTS
ASA 10/50 Ikp:          0.4614 AMPS

IEEE 30° Vkp:           30.2 VOLTS
IEEE 30° Ikp:           0.3610 AMPS

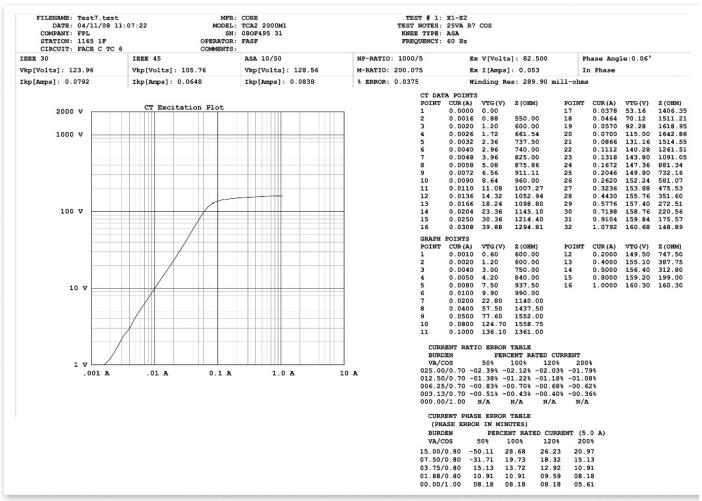
IEEE 45° Vkp:           23.9 VOLTS
IEEE 45° Ikp:           0.2704 AMPS

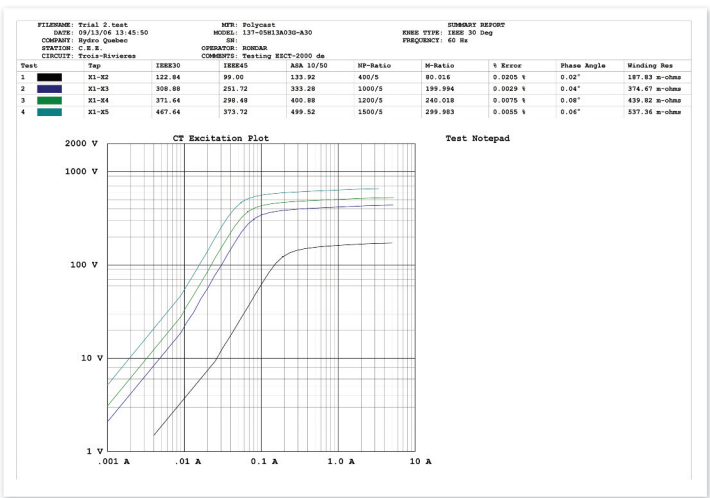
NAME PLATE RATIO:       401:1
MEASURED RATIO:         400.012
PERCENT ERROR:          0.03 %
POLARITY:               IN PHASE
PHASE ANGLE:            + 0.009°
EXCITATION VTG:         15.4 VOLTS
EXCITATION CUR:         0.1972 AMPS

CURRENT RATIO ERROR TABLE
BURDEN          PERCENT RATED CURRENT (5.0 A)
VA / COS φ      50%     100%    120%    200%
15.00 / 0.80    -0.00%  -0.86%  -0.84%  -0.78%
7.50 / 0.80     -0.00%  -0.51%  -0.50%  -0.46%
3.75 / 0.80       N/A   -0.30%  -0.32%  -0.30%
1.88 / 0.80       N/A     N/A   -0.20%  -0.21%
0.00 / 1.00       N/A     N/A     N/A   -0.11%

CURRENT PHASE ERROR TABLE
(PHASE ERROR IN MINUTES)
BURDEN          PERCENT RATED CURRENT (5.0 A)
VA / COS φ      50%     100%    120%    200%
15.00 / 0.80    -50.11  29.68   26.23   20.97
7.50 / 0.80     -31.71  19.73   18.32   15.13
3.75 / 0.80     15.13   13.72   12.92   10.91
1.88 / 0.80     10.91   10.91   9.59    8.18
0.00 / 1.00     8.18    8.18    8.18    5.61
```

▼ PC Printer Output ▼





Current-Transformer Test Set

SPECIFICATIONS

TYPE	Portable current-transformer test set
PHYSICAL SPECIFICATIONS	19"W X 13"H x 15.8" D (48.3 cm x 33.0 cm 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
TEST OUTPUT 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 V
CURRENT READING RANGE	0 – 10A; Accuracy: ±1.0% of reading, ±0.02A
CT CURRENT RATIO RANGE	0.8 – 999: 0.1%; 1000 – 1999: 0.3%; 2,000 – 5,000: 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
INSULATION RESISTANCE READING RANGE	2 Mega-ohms – 500 Mega-ohms; Accuracy: 3% of reading, 500 – 1000 Vdc test voltage
DISPLAY	Back-lit LCD Screen (128 x 64 dot graphic); viewable in bright sunlight and low-light levels
PRINTER	Built-in 4.5-inch wide thermal printer
COMPUTER INTERFACES	One RS-232C (115,000 Baud) port, One USB port
EXTERNAL DATA STORAGE	One USB Flash drive interface port
PC SOFTWARE	Windows® XP/Vista-based CT Analysis software is included with the purchase price
INTERNAL TEST RECORD STORAGE	Stores 140 test records. Each test record may contain up to 10 saturation curves, current ratio readings and polarity & DC resistance readings
INTERNAL TEST PLAN STORAGE	Stores 128 test plans. A test plan consists of the saturation test voltage, current selection, CT nameplate ratios, and CT winding terminal combinations (X1 to X5) for each test
SAFETY	Designed to meet UL 6110A-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)
CABLES	Five 20-foot X cable sets, 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.

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.

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