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EZCT-2000B™

Current Transformer Test Set



Vanguard Instruments Company



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-

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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 (240 x 128 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.

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

Current-Transformer Test Set

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

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.

External Data Storage

The EZCT-2000B features a standard USB Flash drive interface that makes it very convenient to store and transfer test records and test plans. By plugging in a USB Flash drive, you can quickly transfer your test records and plans between a computer and the EZCT-2000B without the need to connect the unit to the computer.

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

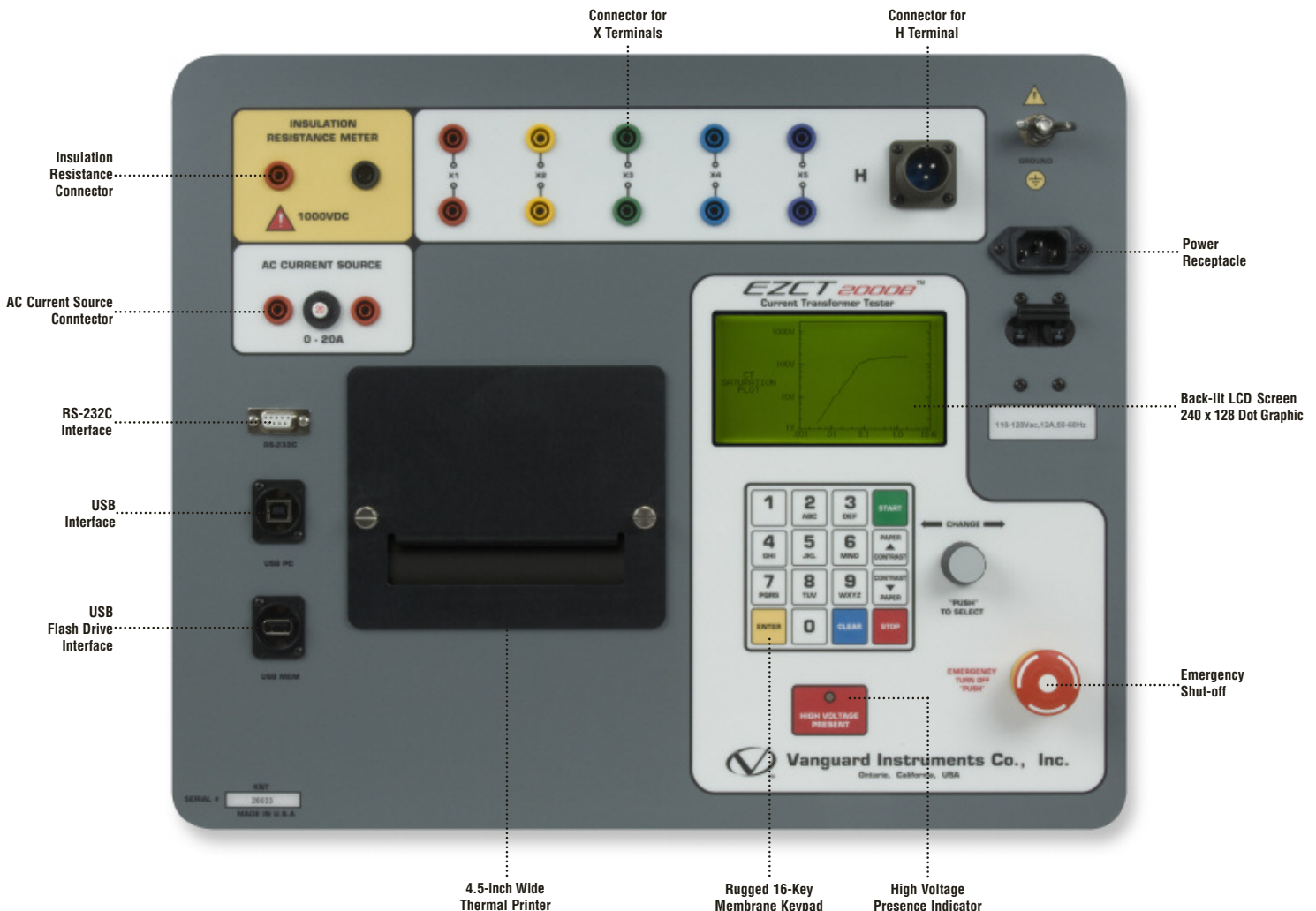
EZCT 2000B™ Shipping Case

4.5-inch Printer Paper

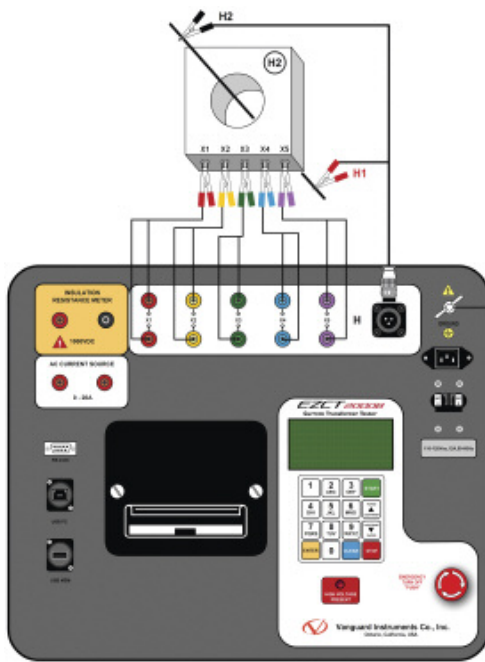
Part No: EZCT-2000B

Part No: EZCT-2000B Case

Part No: Paper TP4



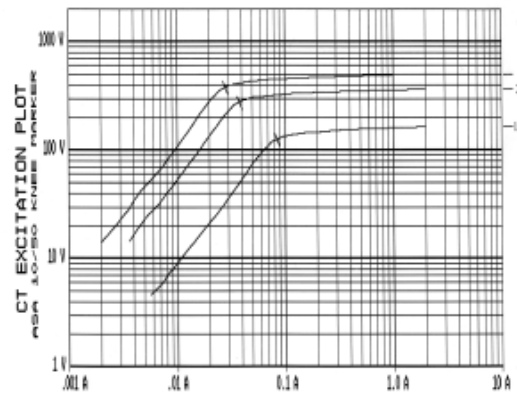
Current-Transformer Testing Made Easy



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:	2.963 V, 23.1°
IMPEDANCE (Z):	0.60 OHMS
BURDEN:	15.02 VA
COS φ:	0.92



CT EXCITATION TEST RESULTS				
DATE: 01/30/2019		TIME: 11.33.10		
COMPANY:				
STATION:				
CIRCUIT:				
MFR:				
MODEL:				
S/N:				
COMMENTS:				
OPERATOR:				
TESTED TAP: H1-H2				
TEST NOTE:				
CT DATA POINTS				
#	CUR (A)	VOLT (V)	Z (OHMS)	DEG
1	0.0196	0.8	39.8	59.6
2	0.0392	1.6	40.0	59.6
3	0.0588	2.4	40.0	59.6
4	0.0784	3.2	40.0	59.6
5	0.0976	4.0	40.0	59.6
6	0.1176	4.8	40.0	59.6
7	0.1372	5.6	40.0	59.6
8	0.1568	6.4	40.0	59.6
9	0.1764	7.2	40.0	59.6
10	0.1960	8.0	40.0	59.6
11	0.2156	8.8	40.0	59.6
12	0.2352	9.6	40.0	59.6
13	0.2548	10.4	40.0	59.6
14	0.2744	11.2	40.0	59.6
15	0.2940	12.0	40.0	59.6
16	0.3136	12.8	40.0	59.6
17	0.3332	13.6	40.0	59.6
18	0.3528	14.4	40.0	59.6
19	0.3724	15.2	40.0	59.6
20	0.3920	16.0	40.0	59.6
21	0.4116	16.8	40.0	59.6
22	0.4312	17.6	40.0	59.6
23	0.4508	18.4	40.0	59.6
24	0.4704	19.2	40.0	59.6
25	0.4900	20.0	40.0	59.6
26	0.5096	20.8	40.0	59.6
27	0.5292	21.6	40.0	59.6
28	0.5488	22.4	40.0	59.6
29	0.5684	23.2	40.0	59.6
30	0.5880	24.0	40.0	59.6
31	0.6076	24.8	40.0	59.6
32	0.6272	25.6	40.0	59.6
33	0.6468	26.4	40.0	59.6
34	0.6664	27.2	40.0	59.6
35	0.6860	28.0	40.0	59.6
36	0.7056	28.8	40.0	59.6
37	0.7252	29.6	40.0	59.6
38	0.7448	30.4	40.0	59.6
39	0.7644	31.2	40.0	59.6
40	0.7840	32.0	40.0	59.6
41	0.8036	32.8	40.0	59.6
42	0.8232	33.6	40.0	59.6
43	0.8428	34.4	40.0	59.6
44	0.8624	35.2	40.0	59.6
45	0.8820	36.0	40.0	59.6
46	0.9016	36.8	40.0	59.6
47	0.9212	37.6	40.0	59.6
48	0.9408	38.4	40.0	59.6
49	0.9604	39.2	40.0	59.6
50	0.9800	40.0	40.0	59.6
TABULATED GRAPH POINTS				
CUR (A)	VOLT (V)	Z (OHMS)	DEG	
0.0196	0.8	40.0	59.6	
0.0392	1.6	40.0	59.6	
0.0588	2.4	40.0	59.6	
0.0784	3.2	40.0	59.6	
0.0980	4.0	40.0	59.6	
0.1176	4.8	40.0	59.6	
0.1372	5.6	40.0	59.6	
0.1568	6.4	40.0	59.6	
0.1764	7.2	40.0	59.6	
0.1960	8.0	40.0	59.6	
0.2156	8.8	40.0	59.6	
0.2352	9.6	40.0	59.6	
0.2548	10.4	40.0	59.6	
0.2744	11.2	40.0	59.6	
0.2940	12.0	40.0	59.6	
0.3136	12.8	40.0	59.6	
0.3332	13.6	40.0	59.6	
0.3528	14.4	40.0	59.6	
0.3724	15.2	40.0	59.6	
0.3920	16.0	40.0	59.6	
0.4116	16.8	40.0	59.6	
0.4312	17.6	40.0	59.6	
0.4508	18.4	40.0	59.6	
0.4704	19.2	40.0	59.6	
0.4900	20.0	40.0	59.6	
0.5096	20.8	40.0	59.6	
0.5292	21.6	40.0	59.6	
0.5488	22.4	40.0	59.6	
0.5684	23.2	40.0	59.6	
0.5880	24.0	40.0	59.6	
0.6076	24.8	40.0	59.6	
0.6272	25.6	40.0	59.6	
0.6468	26.4	40.0	59.6	
0.6664	27.2	40.0	59.6	
0.6860	28.0	40.0	59.6	
0.7056	28.8	40.0	59.6	
0.7252	29.6	40.0	59.6	
0.7448	30.4	40.0	59.6	
0.7644	31.2	40.0	59.6	
0.7840	32.0	40.0	59.6	
0.8036	32.8	40.0	59.6	
0.8232	33.6	40.0	59.6	
0.8428	34.4	40.0	59.6	
0.8624	35.2	40.0	59.6	
0.8820	36.0	40.0	59.6	
0.9016	36.8	40.0	59.6	
0.9212	37.6	40.0	59.6	
0.9408	38.4	40.0	59.6	
0.9604	39.2	40.0	59.6	
0.9800	40.0	40.0	59.6	
WINDING RES = 74.33 m-OHMS				
ASA 30-80 Vmp:	33.7 VOLTS			
ASA 30-30 Imp:	0.4614 ATFS			
IEEE 30-0 Vmp:	30.0 VOLTS			
IEEE 30-0 Imp:	0.3610 ATFS			
IEEE 45-5 Vmp:	23.9 VOLTS			
IEEE 45-5 Imp:	0.274 ATFS			
NAME PLATE RATIO = 40.0:1				
MEASURED RATIO = 40.0:1				
PHASE ERROR = 0.0 DEG				
POLARITY = 0.0 PHASE				
MAGNITUDE ERROR = 0.0 PHASE				
EXCITATION VOLT = 16.4 VOLTS				
EXCITATION CUR = 0.4075 ATFS				
CURRENT RATIO ERROR TABLE				
BURSH	PERCENT RATED ERROR (S.D.)			
UN V / CODE Q	500	1000	1500	2000
18.00 / 0.80	-0.25	-0.25	-0.25	-0.25
9.00 / 0.80	-0.09	-0.11	-0.10	-0.16
3.75 / 0.80	0.13	0.12	0.12	0.10
1.88 / 0.80	0.10	0.10	0.10	0.23
0.94 / 1.00	N/A	N/A	N/A	-0.13
CURRENT PHASE ERROR TABLE				
BURSH	PERCENT RATED ERROR (S.D.)			
UN V / CODE Q	500	1000	1500	2000
18.00 / 0.80	-80.11	-39.68	-26.23	-20.99
9.00 / 0.80	-31.71	19.79	18.92	15.19
3.75 / 0.80	15.13	12.72	12.82	9.81
1.88 / 0.80	1.19	1.19	1.19	1.19
0.94 / 1.00	9.18	0.18	6.18	1.18



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: $\pm 1.0\%$ of reading, ± 1 V
CURRENT READING RANGE	0 – 10A; Accuracy: $\pm 1.0\%$ of reading, ± 0.02 A
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 (240 x 128 dot graphic; 114mm x 64mm); 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 $+122^{\circ}$ F); Storage: -30° C to 70° C (-22° F to $+158^{\circ}$ F)
HUMIDITY	90% RH @ 40° C (104° F) non-condensing
ALTITUDE	2,000m (6,562 ft) to full safety specifications
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 $+25^{\circ}$ C ($+77^{\circ}$ 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, megohm 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.

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www.vanguard-instruments.com