

This Specification Data Sheet  
brought to you by:



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## CTMP-2006

### Instrument transformer and basic protective relay test set



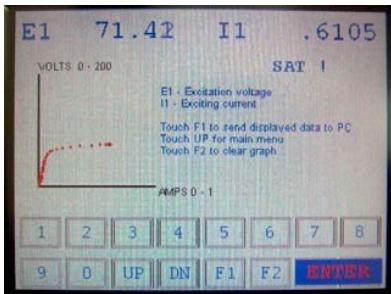
- Performs ratio and polarity test of current, potential and power transformers.
- Saturation test of current transformers.
- AC phase angle and amplitude metering for load tests.
- Secondary injection test.
- High current output with timer for basic relay testing. DLRO function.

The CTMP-2006 is a light weight portable test instrument capable of performing a complete test protocol of instrument transformers and associated circuits. Ratio of current, potential and power transformers are measured by the voltage comparison method and the ratio is calculated and displayed. Current transformers can be tested installed in switchgear, transformers and circuit breakers. Voltage and current inputs are provided to allow the unit to measure an external voltage, current and phase angle. The unit therefore eliminates the need for the phase angle and other meters required to perform a commissioning test of a protective relay scheme. A high current output supplies sufficient current to test most basic over current relays. A timer with a fully configurable stop input is included. The CTMP is a test set that includes a complete array of protective system test functions.

**The CTMP is manufactured by Calvada Technologies**

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[www.cttestset.com](http://www.cttestset.com)



## CTMP Specifications

**TYPE**  Portable Multifunctional Instrument transformer and basic protective relay test set.

**SIZE**  11.25 x 13.25 x 15 (HWD)

**WEIGHT**  39 LBS.

**INPUT POWER**  120 VAC 60 HZ, 240V and 50HZ available if specified.

**OUTPUT TEST VOLTAGE**  0-200VAC @ 2A, 0-1000VAC @0.4A (1 A at 20% duty cycle)

**HIGH CURRENT OUTPUT**  0-80 AAC, 30A continuous, I Squared T protected above 30A.

**CT RATIO RANGE**  5/5 to 100,000/5, Accuracy 0.1%RDG +.01%Scale

**PT RATIO RANGE**  1/1 to 3000/1, Accuracy 0.1%RDG + .01%Scale

**SATURATION CURRENT METERING**  0 to 2AAC, Accuracy 0.4%RDG +.01% Scale

**SATURATION VOLTAGE METERING**  0 to 200/2000VAC, Accuracy 0.2%RDG +.01%Scale

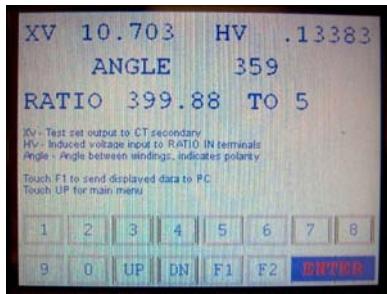
**HIGH CURRENT OUTPUT METERING**  0 to 80AAC, Accuracy 0.5%RDG + .01% Scale. Measures low resistance, 0-6500 micro-ohms, 0.5%Scale.

**TIMER**  100 PPM crystal time base. 0 to 600.00 second range.

**VOLTAGE INPUT**  0 to 130VAC, Accuracy 0.4%RDG 20V to 150V

**CURRENT INPUT**  0 to 6AAC, Accuracy 0.4%RDG 0.2A to 6A

**PHASE ANGLE**  0 TO 360, Accuracy +/- 1 degree.



## Detailed CTMP function description **Ratio Test Mode**

### **Current Transformer Ratio Mode**

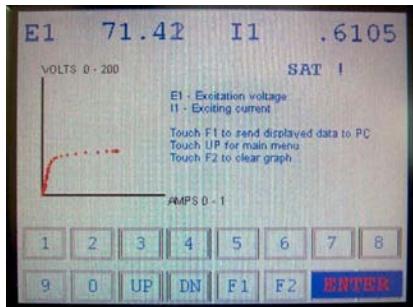
The instrument displays the primary and secondary voltages and the angle between them. Ratio to 5 is calculated and displayed. Complete ratio and polarity data with no lead changes or switch manipulation. Data may be downloaded to PC for easy data sheet creation

Two X1 □ X2 excitation output voltage ranges, 0-200V and 0-1000V, facilitate accurate measurement of CT ratios to 100,000 to 5. Output voltage metering autoranges to a 0-20V scale to maintain accuracy on low ratio transformers. H1-H2 input range is 0-0.32V to allow high resolution with the typical one turn primary used to perform a CT ratio test. Ratio accuracy is 0.1% over the entire measurement range. The unit may be ordered with an optional printer. Printer is located to the left of the display and equipped units are wider.

### **Potential Transformer Ratio Mode**

The instrument displays the primary and secondary voltages and the angle between them. Ratio to 1 is calculated and displayed. As with the current transformer test, no lead changes are required to obtain all test data.

The ratio test is performed by connecting the output of the test set to the high voltage, H1-H2 terminals, of the potential transformer. The low voltage X1-X2 terminals of the PT are connected to the ratio input of the CTMP. The output excitation voltage range in the PT mode is 0-200VAC, with meter autoranging to 0-20V when the output is below 20VAC. Two H1-H2 input ranges are provided, low range offers a 0-3.2 VAC scale and is optimum for PT ratios below 60/1, a high range with a 0.32V scale is used for PT ratios above 60/1. The potential transformer mode may also be used for power transformers of any size and will provide 0.1% accuracy over the entire range of measurements. The CTMP satisfies any transformer ratio test requirement.



## Detailed CTMP function description **Saturation Test Mode**

### **Current Transformer Saturation Test**

The instrument displays the excitation voltage and current. Data may be downloaded to a computer, imported to any PC terminal program and pasted into an Excel spreadsheet for manipulation and creation of a data sheet.

Two X1□X2 excitation output voltage ranges, 0-200V and 0-1000 volts, facilitate saturation of most current transformers. Current output is rated at 400VA continuous with a meter range of 2 amperes. One ampere may be obtained on the 1000V scale if a 20% duty cycle is observed. Transition from the CT ratio test may be made with a simple menu selection, no lead changes are required. The distortion of the exciting current waveform is measured and used to indicate saturation. The word □SAT□ appears under the current value to appraise the operator. The unit also plots a graph of the exciting characteristic during the test.



## Detailed CTMP function description *E and I external metering*

### External Metering Function

The instrument displays the amplitude and phase angle of an AC voltage and current connected to the E and I inputs. The watts, vars VA and power factor are calculated and displayed.

E1 on the display is the amplitude of the voltage connected to the E input, the range is 0 to 150VAC. I1 is the current flowing in the I input circuit, range 0 to 6AAC. Phase angle is measured as 0 to 360 degrees I lag E, Accuracy and resolution is one degree. This mode of the CTMP is designed for verification of correct instrument transformer connections after a protective relay scheme has been placed in service. This test is often called a load test or in service check and is necessary to insure that the current and potential transformers are connected correctly and that relay inputs are receiving the intended signals. In addition to the 0-6AAC hardwire input, a clamp on input is standard and the unit is supplied with a Fluke i200s clamp probe. Unit is calibrated to the supplied probe and scaled to produce a range of 0-10AAC. The screen display for the clamp on function is the same as that for the hard input and allows measurement of phase angle and other parameters without risk of opening a CT circuit or where no metering jack is provided.

The unit will also measure two currents and the angle between them. This function is easily selected from the menu and is useful for verification of current contributions to differential relay circuits. The clamp on measures one current (0 to 10A) and the hardwire binding post circuit measures the other (0 to 6A).

The unit will perform a ratio test of an energized and loaded CT. The clamp on is used to measure a primary current in the range of 0 - 100 Amps. A **duckbill** and the I input binding posts are used to measure the secondary current. The unit will indicate the two currents, the angle between them, and the calculated ratio to 5. Optional clamp probes measure to 1000AMPS primary.



## Detailed CTMP function description

### ***Secondary Injection Test***

### **Secondary Injection Function**

The instrument displays the amplitude of the current output at the X1-X2 terminals and the current input at the I terminals or clamp on (as selected) . The angle between the measured quantities is also indicated.

The OU indication is the current sourced by the X1-X2 terminals, IN is the input current at the I binding posts. Angle is the angle between these currents. The test is performed by connecting the output of the test set to the CT secondary terminals of a complete protective system. The I input is then connected using a suitable paddle or test probe to a relay or other component. The output control is increased to supply a small current and the amplitude and direction of that current is verified in protective and metering devices. This allows a secondary circuit to be proven prior to energization of the protected equipment. Test current range is 0.1 to 2 amperes measured to an accuracy of 0.4%. Angle +/- 1 degree. Clamp on input enhances the utility of this function.



## Detailed CTMP function description *Relay Test*

### Relay Test Functions

The unit will test basic over and under voltage and overcurrent relays to include operate point and time characteristics. The instrument displays the amplitude of the current or voltage at the output terminals and, in the current mode, the voltage at the H1-H2 input (BV). Current may be injected into a CT secondary circuit and burden voltage measured. The unit also measures resistance in a range of 0-6500 micro ohms and will perform time tests of voltage and current relays. The I squared T function protects the test set against sustained overload.

The current mode is capable of 30 amps continuous and is sourced by a 0-10V output of the test set. Currents of up to 80 Amps may be supplied for short duration tests. This mode allows calibration of ammeters, pick up testing of overcurrent relays, and trip testing by secondary injection at the CT terminals. The burden voltage measurement allows convenient testing of secondary burden. The ability of this test set to precisely measure the amplitude and angles of AC voltages and currents allows an accurate determination of the resistive component of an impedance connected to the unit. It can therefore replace the classic □ductor□ or DLRO and measure contact resistance of circuit breakers and switches. Voltage output is 0□ 200V to permit test of over and undervoltage devices connected to 120V PT secondary circuits. A timer is included for the testing of time characteristics, the test set will simultaneously start the timer and apply current or voltage (remove voltage in undervoltage mode). The stop signal can be generated by an opening or closing dry contact. Timer range is 0-650.00 seconds.



## CTMP General Information

The CTMP is housed in a rugged case designed to provide many years of service under typical field conditions. An 18 month warranty is standard on all CTMP-2006 units.

A 5 ampere toggle operated circuit breaker provides control of power to the unit and is easily reset in the event of an overload. No fuses are required.

An output ON/OFF switch allows positive disconnect of output voltage independent of computer control. This feature enhances operator safety.

Premium quality 5 way brass binding posts are used for all test connections. A rugged 700VA variable transformer insures a long life for this component. The variac is an off the shelf item as are the switches, binding posts, circuit breaker, and display. Maintenance, if ever required, may be accomplished without contacting the factory for expensive custom parts.

The use of the CTMP reduces the possibility of test errors and, through its efficient presentation of data and computer interface, expedites testing. These factors represent a great increase in productivity compared to previous test methods.

The CTMP employs an extremely precise AC measurement system that uses a 16 Bit A/D converter and a proprietary sampling algorithm that extracts amplitude and phase information from two AC signals. The ratio mode measures AC voltages to a typical accuracy of 0.05% and requires no separate hardware to measure phase angle. This technology allows a compact multi-functional unit to provide a level of performance previously achieved only in very expensive calibration laboratory equipment. The E and I input accuracy is rated at 0.4% due to variances in magnetics of input isolation transformers. The CTMP-2006 has been upgraded with a faster HCS12 16 bit processor and offers even more accuracy and functionality than previous models.

To order a CTMP

Call Calvada Technologies (702) 297-9233

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