

# CTMP 2020-M

## Instrument Transformer *Test Set*



# CTMP 2020-M

## Instrument Transformer Test Set, Multi-Tap version



- Performs ratio and polarity test of current, potential and power transformers.
- High accuracy of 0.1% or better.
- Saturation test of current transformers.
- X1-X5 tap connections with fully automatic test mode
- AC phase angle and amplitude metering for load tests.
- Secondary injection test.

The CTMP 2020-M performs **ratio, polarity, and phase angle error** tests of the current and potential transformers used in industrial and utility metering and protective relaying systems. The CTMP 2020-M also performs **saturation** tests of current transformers and offers two excitation voltage ranges: 0 to 200VAC and 0 to 1000VAC.

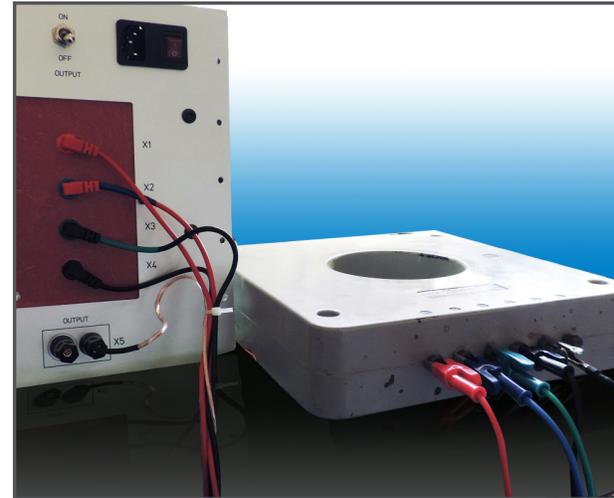
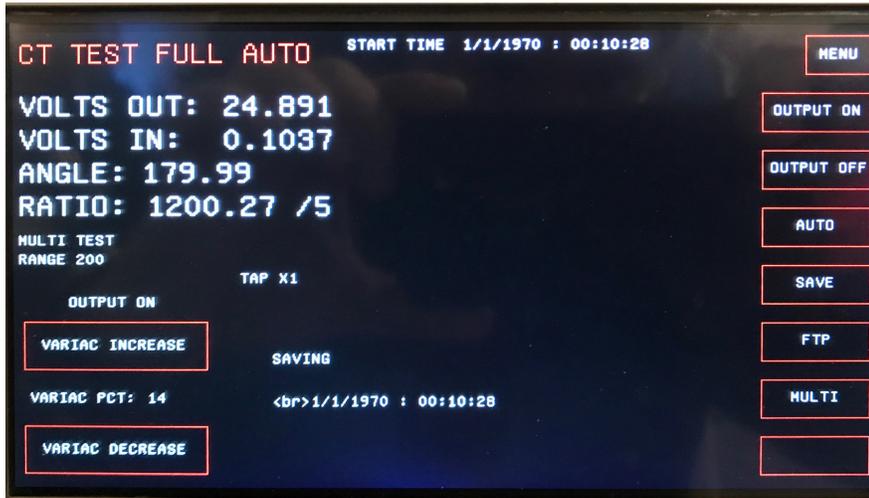
The instrument offers a full function **power system/phase angle meter** that allows measurement of voltage amplitude, current amplitude, phase angle, watts, VARS, power factor, and harmonic content of power frequency signals. The voltage channels can measure the amplitude and angle of two voltages, and additionally, are capable of measuring positive sequence voltage, negative sequence voltage, and unbalance factor of a three phase system. The Rogowski coil input measures to 5000 amps, offers a peak memory ammeter, will time the duration of an applied current, and facilitate live ratio and polarity testing of current transformers.

**General Operation notes:** The CTMP-2020-M has a clear touch sensitive screen, visible even in bright sunlight. Control from the screen utilizes 'hot keys' for quick set up of the automatic test sequence functions in the CT, PT and saturation test modes. On a multi-tap CT, once all connections are made, it steps through settable voltage steps and all X1-X5 taps safely and accurately. Date storage via an Ethernet CAT5 type cable connection to a PC or direct to a router to easily save data to a cloud based server at [www.ctestset.com](http://www.ctestset.com). This server stores files based on serial number of the CTMP and is password protected for other test team members to view and for archiving. The CTMP can also be remotely controlled via an internet connection. Of course the CTMP-2020-M can also be used manually on site from the front panel and data extracted via a memory stick or USB connection to PC.

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# Detailed CTMP-2020-M Function Description



CT Test Mode

## CURRENT TRANSFORMER TEST

The CTMP 2020-M offers 0.05% typical, 0.1% guaranteed ratio accuracy across the measurement range, (0.02% typical in laboratory 23 deg C, +/- 3 deg environment). The instrument features automatic, manual, and remote web test operations and will save data to a thumb drive, via serial (USB) interface to PC, and/or upload it to the CTtestset server. The instrument performs a voltage ratio test and displays the primary and secondary voltages, the angle between them (polarity and phase error), and the calculated ratio to 5. 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 auto ranges 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 in testing a current transformer.

To achieve accurate and meaningful results on low ratio current transformers, the CTMP 2020-M offers correction for winding resistance. If the CT ratio is less than 1500:5 and the correction is more than 0.07% the CTMP will display a COR (corrected) value after the voltage ratio. This removes the large apparent errors caused by winding and equipment wiring resistance.

# Detailed CTMP-2020-M Function Description

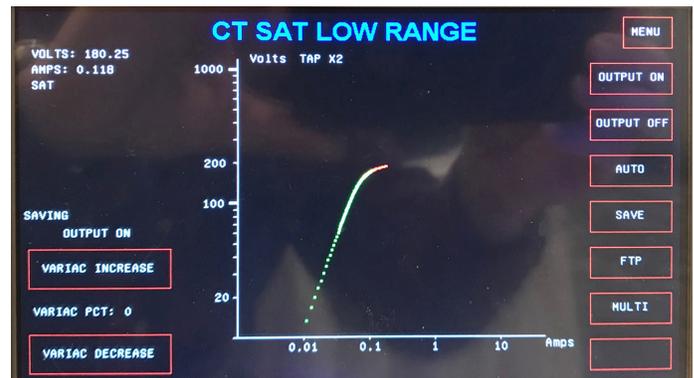
## POTENTIAL TRANSFORMER TEST

The CTMP 2020-M offers 0.05% typical, 0.1% guaranteed ratio accuracy across the measurement range (0.02% typical in laboratory 23 deg C, +/- 3 deg environment). The instrument features automatic, manual, and remote web test operations and will save data to a thumb drive and/or upload it to the server. The instrument performs a voltage ratio test and displays the primary and secondary voltages, the angle between them (polarity and phase error), and the calculated ratio to 1. The H1 - H2 excitation output voltage range is 0-200V and the instrument will test ratios from 1:1 to 5000:1. Low range offers a full scale input voltage of 3.5V and is intended for ratios from 1:1 to 60:1. High range input voltage range is 0.35V and is used to test transformers above 60:1.

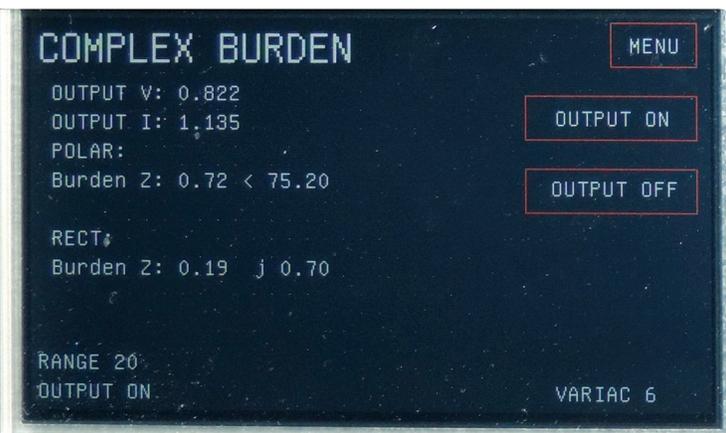
## Saturation Test Mode

## CURRENT TRANSFORMER SATURATION TEST

The instrument automatically performs saturation tests of current transformers and offers two excitation voltage ranges, 0 to 200 VAC and 0 to 1000 VAC. Current output is rated at 300VA continuous with a meter range of 2 amperes. One ampere may be obtained on the 1000V scale if a 20% duty cycle is observed. The CTMP 2020-M displays the excitation voltage and current and plots a graph of the data when the test is complete. A distortion measurement identifies the characteristic CT saturation waveform, flags this point during the test, and in both the saved and plotted data. The instrument features automatic, manual, and remote web test operations and will save data to a thumb drive and/or upload it to the server.



## Secondary Injection and Burden Tests

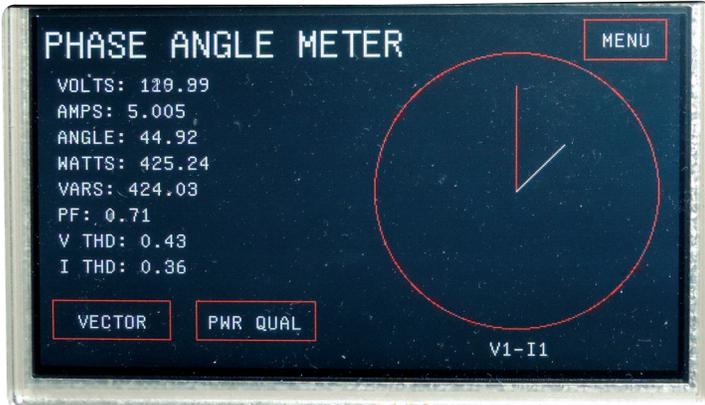


## SECONDARY INJECTION FUNCTION

The Secondary Injection Mode displays the amplitude of the current output at the X1-X2 terminals and the current measured by the supplied clamp on connected to the I2 input. The angle between the measured quantities is also indicated. Burden mode measures the impedance of the connected secondary burden and presents the results in both polar and rectangular form.

# Detailed CTMP-2020-M Function Description

## E and I external metering



## EXTERNAL METERING FUNCTION

The FFT based Vernon Algorithm allows very precise measurement of voltage amplitude, current amplitude, phase angle, and harmonic content of power frequency signals. In addition the meter functions of the CTMP 2020-M calculate and display Watts, VARS, and power factor. The voltage channels can measure the amplitude and angle of two voltages, and additionally, are capable of measuring positive sequence voltage, negative sequence voltage, and unbalance factor of the three phase system.

The Rogowski coil input measures to 5000 amps, offers a peak memory ammeter, and will time the duration of an applied current. It will therefore time the operation of a circuit breaker given a suitable current source. The I1 - I2 and I1 - I3 modes allow a live ratio and polarity test of an energized and loaded CT. The instrument will connect to the internet, data may be viewed on the web, and a logging function configured to report current and voltage events. The meter will post this data to a server via FTP for permanent retention.

### Meter modes are:

**V1 - I1** The meter measures voltage with a range of 0 to 150V, 60 HZ, applied to the V1 input and current with a range of 0 to 10A, 60 HZ, applied to the I1 input.

**V1 - I1** The meter measures voltage with a range of 0 to 150V, 60 HZ, applied to the V1 input and current range of 0 to 10A, 60 HZ, measured by a clamp-on connected to the I2 input.

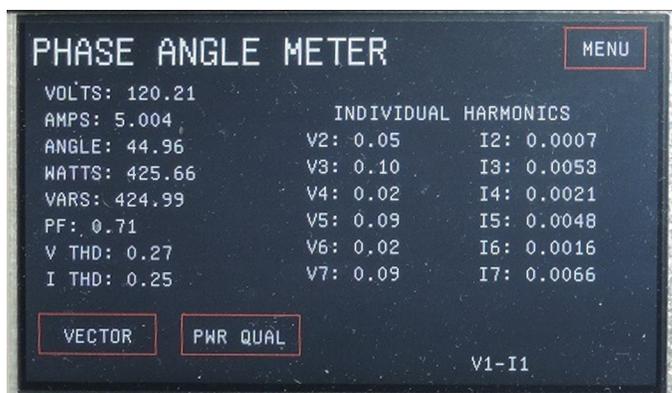
**V1 - I3** The meter measures voltage with a range of 0 to 150V, 60 HZ, applied to the V1 input and current range of 20 to 5000A, 60 HZ, measured by a Rogowski coil connected to the I3 input.

**V1 - V2** The meter measures two voltages with a range of 0 to 150V, 60 HZ, applied to the V1 and V2 input.

**I1 - I2** The meter measures current at the I1 terminals with a range of 0 to 10A, 60 HZ. The meter measures clamp on current with a range of 0 to 10A, 60 HZ, applied to the I2 input.

**I1 - I3** The meter measures current at the I1 terminals with a range of 0 to 10A, 60 HZ. The meter measures current in a Rogowski coil connected to the I3 input with a range of 20 to 5000 amps, 60HZ.

## CTMP 2020-M Specifications



**Size:** 13.1"H x 21.25" W x 18.1"D (33cm H x 54cm W x 46cm D)

**Weight:** 37 lbs (16.8Kg)

**Input Power:** 120VAC, +10/-15%, 60Hz. 240V and 50 Hz also available

**Guaranteed Accuracy:** 32 to 108 deg F (0 to 45 deg C) and 95% non-condensing humidity.

**Operating temp:** 12 to 122 deg C (-10 to 50 degC)

**Storage temp:** 0 to 140 deg F (-15 to 60 deg C)

# CTMP 2020-M Specifications

## INSTRUMENT TRANSFORMER TEST FUNCTIONS

### OUTPUT TEST VOLTAGE

0-200VAC @ 1.5A, 0-1000VAC @0.3A  
(1 A at 20% duty cycle for excitation test).

### CT RATIO RANGE

Typical accuracy 0.05%RDG +.01% full  
scale. Guaranteed accuracy 0.1% RDG.  
Low range 5:5 to 10,000:5, high range  
10,000:5 to 100,000:5.

### PT RATIO RANGE -

Typical accuracy 0.05%RDG + .01% full  
scale. Guaranteed accuracy 0.1% RDG.  
Low range 1:1 to 60:1, high range 60:1 to  
3000:1.

### SATURATION CURRENT METERING

0 to 2AAC, Accuracy 0.3%RDG +.01%  
Scale.

### SATURATION VOLTAGE METERING

0 to 200/1000VAC, Accuracy 0.3%RDG  
+.01%Scale.

### RATIO VOLTAGE METERING

0 to 20/200/1000VAC, Accuracy  
0.1%RDG +.01%Scale.

### PHASE ANGLE

0 TO 360, Accuracy +/- 0.1 degree.

## METER FUNCTIONS

### HARDWIRE CURRENT ACCURACY:

+/- 0.1% of reading, +/- 0.01% of scale over  
a range of .05 AAC to 10 AAC.

### CLAMP CURRENT ACCURACY:

+/- 2.5% of reading, +/- 0.1% of scale over  
a range of .1 AAC to 10 AAC.

### ROWGOWSKI CURRENT ACCURACY:

+/- .85% of reading, +/- 0.05% of scale over  
a range of 20 AAC to 5000 AAC.

### V1 - I1 ANGLE ACCURACY:

+/- 0.1 degrees, voltage range 20 to 150V,  
current range 0.5 to 10 AAC, +/- 0.2 degrees  
current range 0.2 to .5A, +/- 1 degree .025A  
to 0.2A

### V1 - I2 ANGLE ACCURACY:

+/- 1 degree, voltage range 20 to 150V,  
current range 0.5 to 10 AAC

### I1 - I2 ANGLE ACCURACY:

+/- 1.5 degree, current range 0.75 to 10 AAC

### I1 - I3 ANGLE ACCURACY:

+/- 1.5 degree, I1 current range 0.5 to 10 AAC,  
I3 current range 100 to 5000 AAC

### V1 - I3 ANGLE ACCURACY:

+/- 1.5 degree, voltage range 20 to 150V,  
current range 100 to 5000 AAC

### V1 - V2 ANGLE ACCURACY:

+/- 0.1 degrees, voltage range 20 to 150V

**RUGGED FOR  
FIELD USE,  
ACCURATE  
ENOUGH FOR  
LAB USE.**



For a complete description of the CTMP-2020-M PC  
software ability and application notes, email [info@progusa.net](mailto:info@progusa.net)

**MADE in USA**

The CTMP 2020-M is housed in a rugged case designed to provide many years of service under typical field conditions. For maximum accuracy to verify metering CT's, the unit must be operated in 23 degree C +/- 3 degree environment. An **18 month warranty** is standard on all CTMP-2020 units. This **multi-tap version CTMP 2020-M** simplifies connections, minimize operator error and improve overall test time of a multi-tap CT. (5 taps). An output ON/OFF switch allows positive disconnect of output voltage independent of computer control. This feature enhances operator **safety**.

The use of the CTMP reduces the possibility of test errors and through its efficient presentation of data and file save features, 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, 8 channel, simultaneous sampling, A/D converter and the FFT based Vernon Algorithm that extracts amplitude, phase, and harmonic content information from two AC signals. The ratio mode measures AC voltages to a temperature controlled accuracy of 0.02% 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.