RED PHASE INSTRUMENTS

590G-V2 CT ERROR TESTER

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Since 1999, Red Phase has made a revolutionary CT error tester. This new method allowed utilities around the world to test their CT's in an easier and faster way than using traditional methods without jeopardizing accuracy.

Following feedback from our users, our Model 590G-V2 CT is the latest version of this successful and well proven CT error tester.

This new version includes all the advantages of the previous version with additional testing features, better accuracy and a smaller size and weight.

In a world where cost control is gaining importance, this CT tester not only lowers testing costs by being simple, fool-proof and fast. It also allows utilities to pursue the very important (yet many times forgotten) task of testing installed CT's for detecting tampering, and minimizing losses due to faulty CT's.

TEST CAPABILITIES

- CT ratio and phase error measurements. *(Analyses if CT complies with regulations)*
- CT 1.6 kHz Admittance test. *(Helps to determine if CT is faulty i.e. a shorted turn)*
- CT excitation curve & knee point test. *(Traditional CT test)*
- Burden Test. *(Helps to check if the burden connected to the CT is higher than its rated burden)*
- CT winding resistance measurements
- CT polarity measurements
- CT live testing *(With 590F accessory)*
- PT full load simulated tests *(In combination with model 590D)*

KEY FEATURES

- Small & Lightweight *(7 Kg)*, yet tough and durable - *Perfect for field testing and convenient for the workshop.*
- Automatic, fast & fool-proof testing - *Reduce testing times and personnel thus lower testing costs.*
- Customize your tests - *Not only you can use the pre recorded standard tests, but you can also program 590G-V2 to make your own custom made tests.*
- Safe testing - *Simulation method allows testing at lower voltage levels increasing safety.*
- Up to 0.1 Class CT testing - *High accuracy allows testing up to 0.1 class CTs.*
- Built in thermal printer - *For on-site results printing over paper or over labels (Optional).*
- Big 6" screen - *Easily see the results in any light condition.*
- Inbuilt memory - *Store up to 300 test results and download them to your computer or to a USB memory stick.*
- Four terminal test leads - *for superior testing accuracy.*
- Automatic CT demagnetizing after testing .

STANDARDS COMPLIANCE

590G-V2 will test CTs and comment whether they are complying with International Standards. Furthermore, you can input your own standards/regulation requirements and 590G-V2 will make intelligent comments regarding them.

Some of the pre-recorded Standard verifications are (but not limited to):

- IEEE C57.13-1993 Requirements for Instrument Transformers
- IEC 60044 Instrument Transformers

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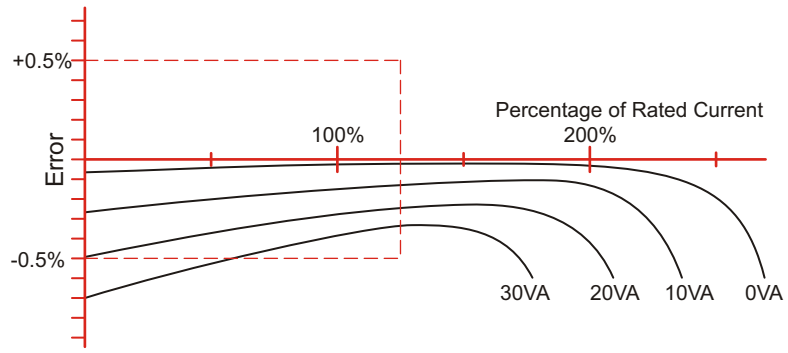
CT RATIO & PHASE ERROR TEST

Making sure that the CT accuracy is within the standard limits is key not only to maximize revenue but also in many places to comply with government regulations and avoid fines.

The most important measurement is the turns ratio, since that typically accounts for 99.5% of the CT ratio accuracy. For that reason the 590G-V2 measures turns ratio within 0.02% for nearly all common CT ratios. The remaining 0.5% of accuracy, and all the phase error, is accounted for by the 50Hz or 60Hz admittance (inherent error) of the CT core. The accuracy of admittance measurement is not so critical.

The following graph shows ratio error curves for a 2000/5 class 0.5 CT with exact turns ratio, at various burden values. The error is due only to admittance. In practice the CT will have turns compensation (the secondary turns ratio could be 399/1 instead of 400/1) which boosts the current output by 0.25% and makes the error curve fit within the 0.5% limits.



Note that the CT accuracy varies not only with the connected burden, but also with the % of rated current circulating through its primary. Generally the CT ratio and phase errors are calculated at 5%; 20%; 100% and 120% primary rated current and 25% and 100% rated burden. These test points can easily be changed to suit any utility need or government regulation.

With traditional primary injection, testing can take over 30 minutes for 10 CT test points. The 590G-V2 will do this automatically in around 5 minutes.

1.6 KHZ ADMITTANCE TEST

The 1.6 kHz admittance of a CT is quite close to the 50 Hz admittance, and it can give a good indication of the inherent error of a CT. It is also an important as it is considered a “blueprint” of the CT.

Once known, the 1.6kHz admittance of a specific CT can be used in future to check a CT during routine meter tests (even without supply interruption using Red Phase Instruments model 505B live admittance tester). It is quick and easy and any loss of revenue due to faults or tampering with the CT is made obvious.

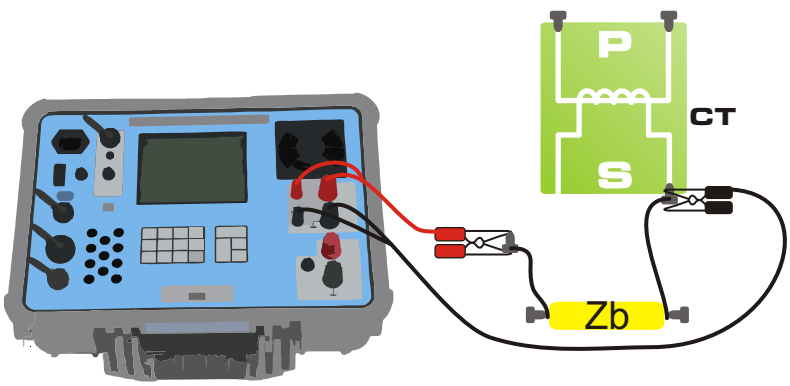
590G-V2 automatically tests the 1.6 kHz admittance of the CT secondary. This can be recorded or compared with a previous measurement of the same CT or with the admittance of similar CTs installed in the system.

BURDEN TEST

As shown in the graph, if the VA burden connected to the CT is large it can cause large ratio errors and revenue will be lost. This is usually more of a problem with low VA rated CTs, say in the 5VA to 15VA range. The 590G-V2 can quickly measure the burden and make sure it does not exceed the rating.

Once you have the real burden value for the CT, you can also opt to perform a error test to see what errors the CT has at exactly that burden.

BURDEN TEST CONNECTIONS



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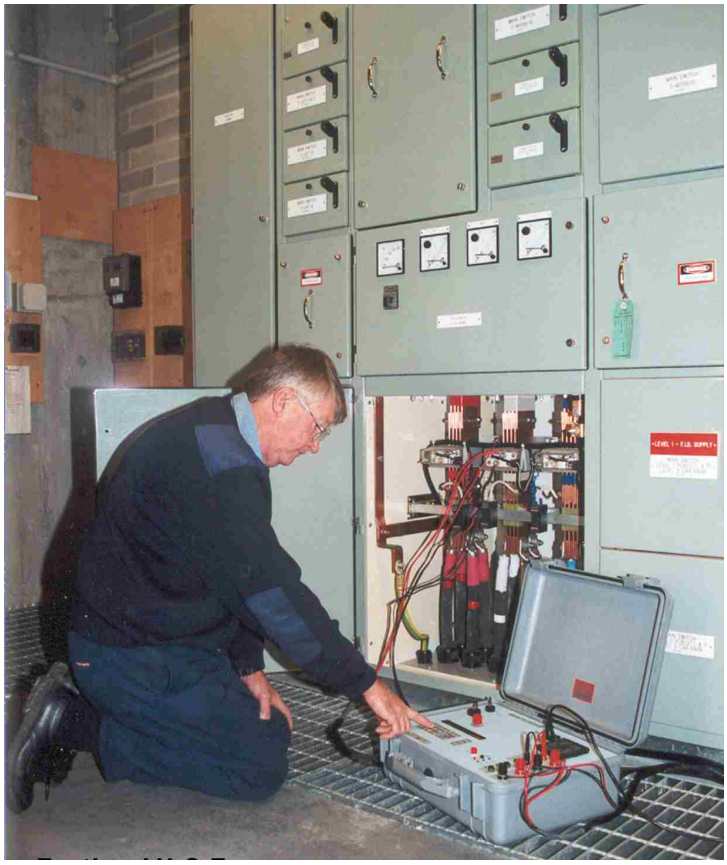

POLARITY MEASUREMENTS

590G-V2 will automatically report if there is a polarity error in the CT.

This error could be caused either incorrect marking by CT manufacturer or incorrect installation.

EXCITATION CURVE TEST

This is a very traditional test for CTs. Although not strictly needed after the 590G-V2 tests at the usual 10 test points to make sure the CT error is within limits when connected to a burden within its rating, many utilities still like to see an excitation curve.

The 590G-V2 will display and/or print (with the optional printer accessory) the excitation curve of the CT and will give the knee point according to any of the three knee point methods:
1) A 10% increase in the exciting voltage results in a 50% increase in exciting current
2) The 35° tangent point.
3) The 45° tangent point.

LIVE RATIO TEST

Combined with the Model 590F accessory, the 590G-V2 performs a live ratio and phase error test with customer load, on either LV CTs or HV CTs. The 590F uses electronically compensated clipons, and fibre optic connection for HV CTs.

Both LV & HV kits are available, The kit includes a 100m fibre optic cable drum for testing in locations where the HV CT primary is not close to the secondary test point.

590F accessory is the perfect solution for fast CT testing where customer supply interruption is not an option.

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BACKGROUND

In an era where costs, revenues and service levels are every day more important for utilities worldwide, a low cost method to deal with CT metering errors caused either by tampering or equipment failure is an important part of the equation.

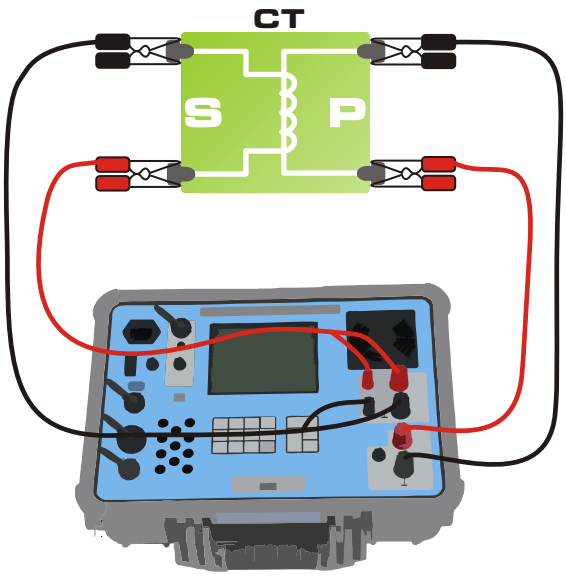
Testing CTs should be a crucial part of utility monitoring. In general utilities make in-field meter tests (especially when meter readings are suspected) and forget to test the CTs related to those meters, which are as important as the meters.

Traditional CT testing (primary injection) has many disadvantages. Not only is the equipment bulky, heavy, expensive and difficult to use, it is a time consuming method.

More than 10 years ago Red Phase Instruments designed the first series of Model 590 to make a major improvement in field testing CTs. With the feedback we got from our worldwide customers and following our continuous improvement search, this product evolved (adding new features and improving existing ones) into this latest version.

Red Phase Instruments 590G-V2 is the perfect solution for utilities looking to improve revenues and service quality and at the same time lower costs. This state of the art yet proven CT testing system is small, light, durable, robust, easy and fast to use with a minimum personnel.

CONNECTIONS



INCLUDED ACCESSORIES

- Foam Lined transit case for protection in transport.
- 6 m Testing leads with banana plugs.
- Crocodile clamps for primary and secondary connections.
- User manual

OPTIONAL ACCESSORIES

- Thermal Printer.
- 590G-V2 Calibration/Reference CT
- Custom Length test leads.

COMPLEMENTARY PRODUCTS

590F performs **live** CT ratio test when connected to 590G-V2.

Battery operated with microprocessor compensation to use over a wide operating range of CTs, Typically from 50A to 1500A.

Supplied with a 100m fiber optic cable.

590D1 performs **full load inductive PT (VT)** tests when connected to 590G-V2.

Built with a high power switch mode source for full load performance testing under simulated conditions to 0.1% accuracy.

Uses 590G microprocessor for testing but includes own microprocessor for monitoring & control.

505B performs **live** 1.6kHz admittance tests without interruption of the customer's service.

It is a quick and simple way of checking Cts during a routine kWh meter test.

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TECHNICAL DATASHEET

CT ratio measurement (Turns ratio of secondary to primary winding)	up to 99.000 /1
CT Measurement accuracy	
Ratios 0.5/1 (2.5/5) up to 4.000/1 (20.000/5)	0.02%
Ratios 4.000/1 (20.000/5) up to 15.000/1 (75.000/5)	0.03%
CT Ratio error test accuracy	
Currents between 5% and 120% rated value	0.02%
CT Phase error test accuracy	
Currents between 5% and 120% rated value	1 min
PT (VT) Measurement accuracy	
Ratios 1.5kV/100V up to 500kV/110V	0.02%
Ratios 500kV/110V up to 1000kV/110V	0.03%
Winding Resitance Accuracy	0.2 % + 1 mΩ
External Burden accuracy	0.2 % + 1 mΩ
1.6 kHz Admittance accuracy	0.5 % + 100 µS
Magnetising Curve Knee Point	3 methods (10%-50%; IEEE-30; IEEE-45)
Input Power	100 V to 250 V (50 Hz or 60 Hz) or 12V car batery
Standby	20 VA
Testing	50 VA
Display	15 cm (6") Readable in bright and low light conditions
Records Storage	Internal memory (stores more than 3.000 records)
PC transfer	USB port
Size	410 x 330 x 180 mm (16" x 13 " x 7 ")
Weight (Without accessories or test leads)	7 kg (15.4 lb)

Subject to change without notice

RED PHASE INSTRUMENTS has been providing instrument and testing solutions for the worldwide electric power industry for more than 35 years.

From our headquarters in Melbourne, Australia, we design and manufacture state of the art equipment that often no other company makes. We also manufacture and service older an more mature products that are still in demand.

Our customers vary from the very largest national utilities to small pacific island cooperatives with only 10MW capacity.

No matter who our customers are, we plan to give them excellent service and products helping them to achieve the maximum result at a reasonable price.

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