

UTILITY TEST SOLUTIONS



RED PHASE INSTRUMENTS

PRODUCT CATALOGUE



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Delivering Test Solutions Reliably for 40 years.

Since 1976 power companies have relied on test solutions from Red Phase Instruments to provide assessment data of vital electrical and utility infrastructure.

A trusted quality manufacturer, our equipment is built to withstand the rigours of continual field work and long term use by service personnel.

With some products still in service after 25+ years we are a constant and reliable utility partner that provides quality test equipment and engineering services at the most technical level.

With an approachable attitude, Red Phase Instrument's technical staff are easy to reach, providing utilities with the confidence that assistance and advice is a phone call away.

UNIQUE
CUSTOMIZED
RUGGED



INSTRUMENTATION

01





INSTRUMENTATION

01

C.T. TESTING

Model : 590G-V2
Type : Metering CT Tester and PT ratio tester
Rating : 110 to 250Vac or 12Vdc, 50VA

The 590G-V2 is a CT test instrument which employs a secondary injection method, first pioneered by Red Phase Instruments, to test the ratio and phase accuracy of a Current or Potential Transformer under simulated burden conditions.

The 590G-V2 can also be used in conjunction with the 590F and / or the 590M to test a CT's ratio and phase error on line or "live" avoiding the need to shutdown a power network.

Also when used with the 590D-1 accessory the 590G-V2 is able to measure inductive PT ratio and phase error under under voltage load and burden based conditions in accordance with elements of IEC standards.



OFFLINE CT TESTING

OFFLINE CT/PT TESTING



C.T. & P.T. TESTING

Model : 590J-V2
Type : CT and Inductive PT tester
Supply : 220 to 240Vac

A truly portable instrument transformer test unit. Able to perform the following offline tests:

- Metering CT ratio and phase errors under burden conditions and in accordance with existing and / or user defined test points and international standards such as IEC 61869-2.
- Protection CT Testing.
- Inductive PT testing under burden and varying load voltage conditions as per IEC 61869-3.
- Live CT ratio and phase testing with 590F accessory

Metering CT Accuracy	0.1 Class
Protection CT	Standard and Transient
Inductive PT's	To 330KV



INSTRUMENTATION

01



Blackburn, Australia

LIVE C.T. TEST ACCESSORY

Model : 590F
Type: : Online metering CT test accessory
Rating : 600V & 100kV
Supply : Battery, 590G-V2 or 590J-V2

CT CLAMP ON ACCESSORIES

Model 590F is a broad term used to describe the measurement abilities of a series of clamp on CT models used in conjunction with our popular offline CT tester called the 590G-V2 or the new 590J-V2.

Combined they are capable of testing a metering CT's ratio and phase accuracy on an active, "live" power network thus avoiding shutdowns and customer down time.



Type	Current Range
590F1 HV optically isolated including hotstick	75A to 1400A
590F2-50ID LV	150 to 2500 Amps
590F2-85ID LV	100 to 750 Amps
590F3 HV optically isolated including hotstick	5 to 100 Amps



INSTRUMENTATION

01

CT CURRENT
SOURCE

CT ADMITTANCE
TESTING



LIVE C.T. TESTING

Model : 590M
Type : CT test accessory
Supply : 240Vac Rating : 200VA

The 590M is a current injection source that can be employed together with a 590F Clamp on CT and the 590G-V2 or 590J-V2 tester.

During a live CT test the 590M, controlled by the 590G-V2 or 590J-V2, automatically adjusts the primary current level through an in-circuit CT by adding or subtracting the current required to attain the desired test point current level. Once at the desired test point, the 590G-V2 and the 590F automatically calculate the ratio and phase error before adjusting the CT primary current to the next desired test point or current level.

Maximum Current	Up to 200 Amps
Operating Current	Up to 100 Amps
Auto Current Adjust	Via 590G-V2 or J-V2
Manual Current Adjust	Ampere Turns

LIVE C.T. TESTING

Model : 505B
Type : Online 1.6kHz CT Admittance Tester
Supply : Battery powered

The admittance of a current transformer or CT provides a direct indication of its core energy loss characteristic.

This core energy loss is a reflection of the CT's ability to translate current and phase information accurately. The field portable 505B instrument can measure these core losses quickly providing the operator with a picture of a live CT's operational status while in-circuit.

The Live VA burden of the CT's metering loop can also be measured from the test block or at the CT secondary terminals.

Max Admittance Range	Up to 50mS
50/60Hz current range	0 to 10 Amps
5 Amp burden range	0 to 100VA



INSTRUMENTATION

01



Energex Australia

590G-V2 P.T. TEST ACCESSORY

Model : 590D

Type : Load based Potential Transformer tester

Supply : 84 to 265Vac, 50 or 60Hz

OFFLINE PT
TESTING

The 590D-1 together with the 590G-V2 has the ability to test offline inductive instrument PT's to 330kV under full burden and varying load voltage conditions in accordance with IEC 60044-2 and IEC 6189-3 standards thus simulating real field based operations which the PT will be subject to.

Max Ratio 330kV/100V	To 50VA
Max Ratio 220kV/100V	To 100VA
Max Ratio 110kV/100V	To 300VA
Test Points	As IEC 6189
Burden Range	To 500VA
Measurable Windings	Up to two





INSTRUMENTATION

01



CVT Test Range	To 550KV
Ratio Accuracy Metering	From 0.05%
Ratio Accuracy Protection	From 0.15%
Output Voltage	0 - 3KV
Burden Range	To 500VA
Measurable Windings	Up to three

C.V.T. TESTING

Model : 590K
Type : Capacitor Voltage Transformer tester
Supply : 84 to 265Vac, 50 or 60Hz

OFFLINE CVT TESTING

Since 2007 the 590K has been used to determine a CVT's ratio and phase error under simulated test conditions which closely match its online performance.

With multiple test points to choose from the 590K offers a true look at a CVT's performance under varying burden and load voltage conditions in accordance with IEC 60044-5 and IEC 61869-5.

The 590K is not a simple ratio name plate comparator. It is a first in its class truly portable CVT test platform trusted by field service and laboratory personnel globally.



Wonthaggi Australia

EARTH TESTING

02

R

ed Phase Instruments design and manufacture rugged, quality earth testing and measurement equipment. Constantly innovating we are developing an ever increasing portfolio of products that will assist earthing professionals with the assessment of an electrical installations integrity.

Product areas

Current Injection Equipment: Assessing the performance of an electrical installation's earthing system under current fault conditions can only be performed with a current injection source. This current source when properly managed will simulate a lower level, (off frequency), current fault in and around an electrical installation. This induced current will produce various potentials throughout the test site and these can be measured using a similarly tuned multimeter.

Lightning impedance: To measure the impedance of an earthed structure under lightning impulse conditions requires being able to simulate or imitate the spectral response of the impulse. Our instrument allows for two shaped current impulses to be applied to a structure such as a pylon tower footing to determine a Direct impedance path measurement and an Electrode Impedance measurement analogous to a Fall of Potential test at low frequency.

Grid / Ground Bonding: The bonding integrity between electrical equipment and the earth grid to which it is connected can be compromised over time due to weather induced changes in soil chemistry and at times equipment handling. A reliable indicator of a metallic structure's grid bond can be determined with a continuity test at both D.C. and alternating D.C. levels.



EARTH TESTING

02

CURRENT INJECTION

Model : 4046
Type : 2kVA Current Injection Unit
Supply : 220-240Vac, 50 or 60Hz

The 4046 is a switch mode current injection source that is used with the Model 4047C shown below to inject a current at a selectable frequency into an earth loop. A feedback control loop from the 4047C indicates to the 4046 what adjustment to the voltage magnitude is required to maintain the chosen RMS current.
The 4046 comes with a GPS add-on feature which, together with our tunable multimeters allows the operator to take current branch phase angle readings without the need for a separate phase reference cable.



Output Power	2000VA
Selectable Frequency Range	40Hz to 70Hz
GPS Phase Synch	Available

EARTH SYSTEM
TESTING



CURRENT INJECTION

Model : 4047C
Type : 2kVA Coupling Transformer
Supply : Powered via 4046

The 4047C galvanically isolates the 4046 from the earth loop. To maximize output power, the 4047C has multiple output voltage and current taps to achieve the optimum impedance match between the load and the 4046.
Note: The 4047C is designed for continuous operation at 2kVA.

Input Voltage	180V AC nominal
Output Voltage Max	800V AC
No. of Transformer Taps **	Eight, from 5 Ω at 20A to 400 Ω at 2 A

EARTH SYSTEM
TESTING

** : 4047C transformer output taps can be customized



EARTH TESTING

02

CURRENT INJECTION

Model : 4041

Type : 8kVA Current Injection Unit

Supply : 3-phase, 300-430Vac, 50 or 60Hz

The 4041 is a switch mode current injection source that is used with the Model 4043 shown below to inject a current at a selectable frequency into an earth loop. A feedback control loop from the 4043 indicates to the 4041 what adjustment to the voltage magnitude is required to maintain the chosen RMS current.

The 4041 comes with a GPS add-on feature which, together with our tunable multimeters allows the operator to take current branch phase angle readings without the need for a separate phase reference cable.

Output Power	8000VA
Selectable Frequency Range	40Hz to 70Hz
GPS Phase Synch	Available

EARTH SYSTEM
TESTING



CURRENT INJECTION

Model : 4043

Type : 8kVA Coupling Transformer

Supply : Powered via 4041

The 4043 galvanically isolates the 4046 from the earth loop. To maximize the output current, the 4043 has multiple output voltage and current taps to achieve the optimum impedance match between the load and the 4046.

Note: The 4043 is designed for continuous operation at 8kVA.

Input Voltage	350V AC nominal
Output Voltage Max	800V AC
No. of Transformer Taps **	Eight, from 1 Ω at 90A to 80 Ω at 10A

** : 4043 transformer output taps can be customized

EARTH SYSTEM
TESTING





EARTH TESTING



MULTIMETER

Freq Selective
Multimeter

Model : 4031-R and 4031-L

Type : Tunable Multimeter

Supply : Internal 3.7V lithium battery, rechargeable

The 4031 is a truly portable series of frequency selective multi-meters, purpose built for the detection of a tuned AC signal generated by Red Phase Current Injection equipment.

The 4031 is able to measure the following parameters easily and accurately which are important for the safety of both the general public and utility personnel:

- Step and touch voltages
- Fall of Potential (3 and 4 point)
- Current branching with cable-less phase synch
- Soil Resistivity Measurement (Wenner or Schlumberger)

The 4031 comes with either a Lemo rogowski current input, 4031-R, or a Flex Lem rogowski current input, 4031-L.

Voltage Input Range	200 Volts
Current Input Range	200 & 300 Amps
Selectable Frequency Range	40Hz to 70Hz
GPS Phase Synch	Available
Record Download	Via USB

MULTIMETER

Freq Selective
Multimeter

Model : 4025E

Type : Tunable Multimeter

Supply : 6V Rechargeable sealed lead acid battery

The 4025E is a frequency selective multimeter purpose built for the detection of a tuned AC signal generated by Red Phase Current Injection equipment.

The 4025E is able to measure the following parameters easily and accurately which are important for the safety of both the general public and utility personnel:

- Step and touch voltages
- Fall of Potential (3 and 4 point)
- Current branching with cable-less phase synch
- Soil Resistivity Measurement (Wenner or Schlumberger)



Voltage Input Range	800 Volts
Current Input Range	200 & 300 Amps
Selectable Frequency Range	40Hz to 70Hz
GPS Phase Synch	Available
Record Download	Via USB
Current Input	Lemo & Flex Lem



EARTH TESTING

02

LIGHTNING IMPULSE TESTER

Model : 4051
Type : 32 Amp Impulse Impedance tester
Supply : 12V Rechargeable sealed lead acid battery

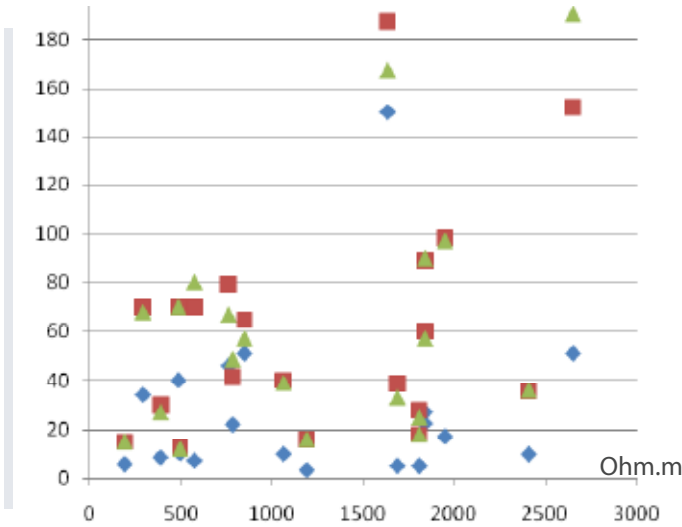
The lightning impulse impedance test instrument is used to measure the impulse ground impedance of a transmission pylon footing or other grounded structures without the need to disconnect the overhead ground conductor.

Portable and battery operated, the 4051 tests a grounded structure's lightning impedance by applying a selected impulse profile signal at up to 32A directly to the Pylon footing. The resulting peak load current and voltage is measured and the impedance figure is determined from this.

The chart at right shows the impedance results of 20 tower footings against soil resistivity using a standard 3 point fall of potential set up. The impedance tests performed were:

- A 128Hz low frequency test
- Two impulse tests conducted using the 4051

Pylon footing Impedance per tower in Ohms

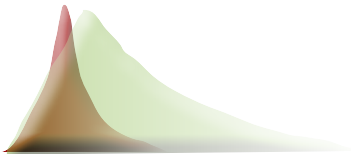


- Low frequency 128Hz test indicated by:
- 8 / 20uS impulse test indicated by:
- 10 / 350uS impulse test indicated by:

Up to 5 further impulse profiles are available on the 4051 upon request.



Impulse Impedance
Testing



Pulse Current Output	0.5A to 32 A
Maximum Pulse Voltage	800V
Impedance Range	0.5 Ω to 300 Ω



EARTH TESTING

02

Ground Bond Testing

EARTH CONTINUITY TESTER

Model : ECT-4
Type : Continuity Meter for metallic and ground or grid bonded structures
Supply : External Lithium battery pack

The Model ECT-4 is used to test the continuity of connections of bonded structures within an earthing system or grid such as a substation. Such structures include the electrical equipment itself and peripheral elements such as the equipment guards and the substation’s fencing.



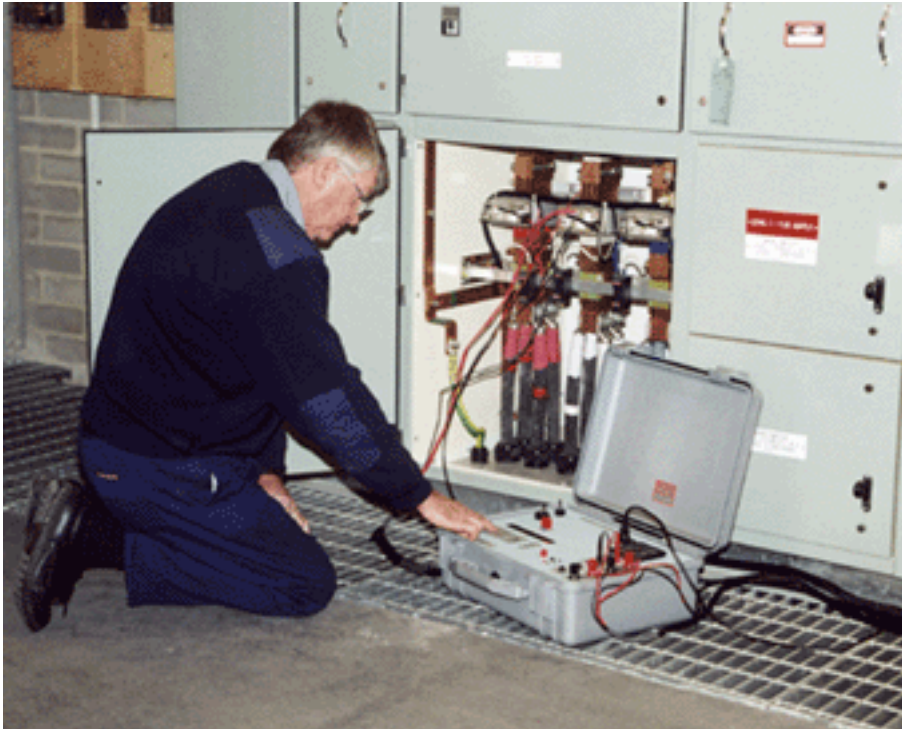
The ECT-4 comes with a 10 metre and 100 metre extension cable allowing the operator to move the test probe to multiple test points around the grid. To extend the test length, further extensions can be ordered in multiples of 100 metres. When running on its external power source it can last over 5 hours from full charge. To maintain battery integrity the unit has a battery status indicator and a low battery shutdown feature.

Other features:
The ECT-4 has a rugged ergonomic pistol grip probe for easy handling. The stainless steel probe pins rotate and retract when pressed onto a bonded metallic structure, making for easier connection to metal through corroded and painted surfaces. The probe’s LCD display provides voltage, current and resistance data during tests and 3 push buttons allow the operator to adjust the test modes and change the current ranges.

Output Voltage: Battery	14.4Vdc
50Hz and 60Hz rejection	100dB
Selectable Current Levels	1 A, 2A and 3 Amps
Accuracy	± 0.05% w.r.t. full scale
Resistance Resolution	10uΩ from 0 to 0.2Ω
Resistance Resolution	100uΩ from 0.2Ω to 4.0Ω
Output Current Accuracy	± 2%
Current Stability	< 10ppm / second

- Operating Current Modes:
- Forward D.C.: Continuous
 - Reverse D.C.: Continuous
 - Pulsed Cycle: Forward and Reverse





METER TESTING

The function of a revenue meters is to provide energy usage information to a utility. This information can be used to manage costs, profits and the energy resources amongst its generation, transmission, distribution and wholesale customers.

Correct energy consumption readings are crucial to managing this properly and thus regular calibration or meter audits are a necessary part of maintaining a meter's accuracy.

Since 1976 Red Phase Instruments have helped utilities all over the world with revenue meter test equipment and calibration solutions. Take a look at our portfolio of meter testing and calibration products.



WH & KWH METER TESTING

03

SINGLE PHASE

Model : 471

Type : Single Phase Meter Tester with 30A current source

Supply : Mains or meter powered , 100 - 270V, 50 or 60Hz

KWH Meter

Testing

Robust single phase KWh meter test unit with a 30 Amp Phantom load current source.

Built to last, the 471 is not a solid state unit, hence far more fault tolerant than switch mode types. It has the following ranges:

- Input voltage ranges: 70V and 270V.
- Output current settings: 0.5, 1, 1.5, 2, 3, 5, 10, 15, 20, 30A
- PF settings: 1.0, 30 deg lag, 60 deg lag. Tolerance +/-5%



Energy Measurement Accuracy	0.05%
Displayed Voltage Accuracy	1%
Frequency resolution / accuracy	0.1Hz
Phase Angle accuracy	to 1 degree



POLY-PHASE

Model : 691

Type : 19" Bench Mount Polyphase Reference Standard

Supply : Meter powered, 50Hz or 60Hz

KWH Meter

Testing

RModel 691 is packaged in a 19" style bench-top case with all connections on the front panel for use in Meter test benches.

It has inputs for comparison with another poly-phase standard or 3 separate single phase standards for verifying calibration accuracy.

Real Energy Accuracy	0.05%
Voltage Accuracy	1%
Voltage Ranges	60V, 120V, 240V, 480V
Current Accuracy	0.01 Amp
Current inputs	10 & 100 Amp



WH & KWH METER TESTING

03

POLY-PHASE

Model : 689B

Type : 3-Phase KWH Meter Tester with
3 x 100A Current Source
Supply : Mains or meter powered.

KWH Meter
Testing

The 689B is a combined WH Meter Tester and 100A phantom load or current source.

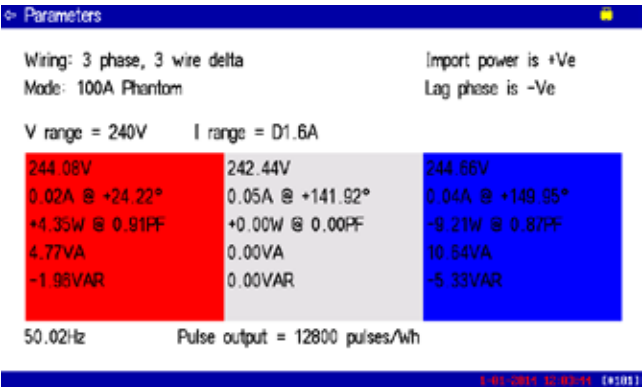
It can inject up to 3 x 100A into direct connected meters via an integrated switch mode source. It also has a 10A injection circuit for testing CT operated meters.

The colour display shows the information needed in typical meter testing operations. Up to 1000 test records can be stored for later downloading to USB. Screen shots directly to USB can also be made.

All the accessories needed to test disc and electronic meters are supplied.

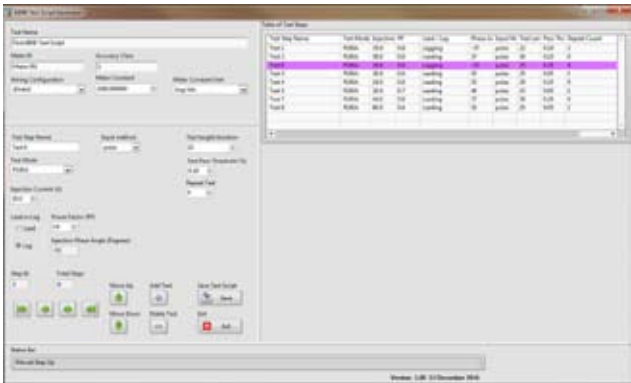
Automatic test feature available for multiple tests.

Colour Graphics display



Max Direct Connect Current out	100 Amps
Max CT Connect Current out	10 Amps
Real Energy Accuracy	0.03%
VARH Energy Accuracy	0.15%

Windows based Auto Test script generator software



Run multiple tests on a fixed meter configuration.

Supplied free, the Automatic test script generator software allows the operator to create a Fixed Wire test script containing up to 200 individual meter tests with varying test points and operating parameters.

PHANTOM LOADS

ADJUSTABLE CURRENT SOURCES FOR WH METERS

Model : 462J

Type : CT Meter Current Source

Supply : Meter Test Block

**Meter Current
Source**

The 462J is designed for use with any field meter test set such as the 679E to test polyphase C.T. meters.

It can be powered from the metering test block, and will test nominal 240V, 3 phase, 4 wire star connected L.V. meters or nominal 63.5V star connected H.V. meters. It can also test nominal 110V, 3 phase, 3 wire delta connected meters.

The 3 current outputs are variable from 0 to 100% in 1A and 10 A ranges in coarse (10%) and fine (1%) increments. Phase angle/power factor settings are available from 60° LEAD to 90° LAG in 15° increments.



Model : 467B-30

Type : 200VA Current Source

Supply : Meter Test Block

**Meter Current
Source**

This three phase phantom load is perfect for use in energizing CT or Direct connected meters for commissioning or routine testing.

The 467B-30 can deliver up to 200VA per phase and the operator is able to linearly adjust the current injection amplitude from zero to full scale. Shrouded safety plugs and sockets are used to connect the cables to the front panel.

The input required is 240V/415V 3 phase, 4 wire and this is protected with a 3 pole circuit breaker.



Model : 472

Type : Current and Voltage Source

Supply : Meter Test Block

**Meter Current
Source**

The 472 is a bench mount 3 phase, 4 wire 240V/415V 50Hz & earth current and voltage source. Output configuration is switchable from star to delta.

- 3 phase, 4 wire star 240V / 415V nominal.
Max 0.7A, 160VA. Output controlled by 3 variacs adjustable from 0 - 110%.
 - 3 phase, 3 wire delta 110V nominal.
- The output of VA and VC terminals is 110V nominal w.r.t. N terminal.





Partial Discharge Testing

An electrical event such as a high voltage spark occurring across a portion of an insulating medium between two electrodes is called Partial Discharge.

Partial discharge can at times be seen in free air such as with a coronal glow on a power line insulator.

However the most common forms of partial discharge are not visible and occur within solid or fluid insulators which separate conductive zones from each other.

Partial discharge by its nature does not get better and is therefore an obvious pre-cursor to a high voltage equipment's eventual breakdown.

Hence monitoring PD strength is one of the most effective forms of equipment diagnosis and maintenance.

Detection of PD can be done in a number of ways as the discharge signal can manifest itself in a variety of forms.

Electric, electromagnetic, acoustic and ultrasonic.



PARTIAL DISCHARGE ANALYSIS

05



Chenzhou, China

PD TESTER

Model : PDT - 832B

Type : Statistical PD Tester

Supply : Mains

Partial Discharge
Testing

Using the 832B, utility assets such as cables, transformers and switchgear can be monitored for destructive insulation breakdown caused by persistent high voltage discharge events.

The 832B combined with purpose designed electromagnetic and acoustic sensors is a statistical 3 or 4 channel PD event monitor with the flexibility of sensor gain and frequency adjustment. This allows the operator to target and view the discharge events of interest in a magnitude distribution plot across the mains line frequency phase angle.. Statistical PD event capture and recording can be easily adjusted for or the operator can view the PD events in real time.

The operator can adjust the combination of sensors shown at right for specific measurement tasks or equipment monitoring.



Partial discharge location detection in a high voltage switch cabinet

Switch cabinets contain high voltage elements such as break or make, control and protection equipment.

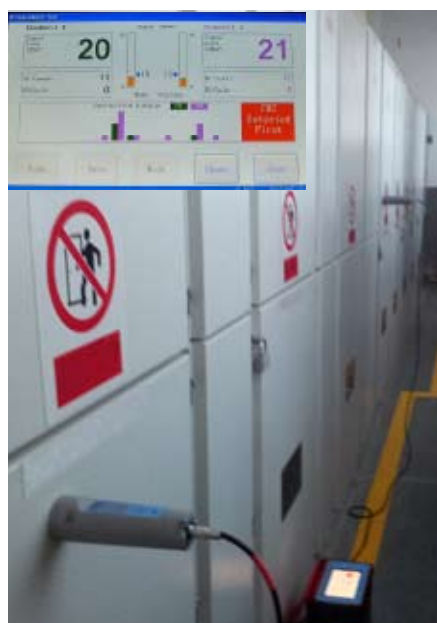
These elements are susceptible to mechanical and insulation discharge problems.

The PDT-120 is used extensively in the detection and location of PD in switch cabinet rooms using TEV probe detection methods as shown below.

To determine the effectiveness of the PDT-120 for yourself please contact Red Phase Instruments for a practical demonstration at a HV location of your choice.

PARTIAL DISCHARGE ANALYSIS

05



PD TESTER

Model : PDT - 120

Type : Partial Discharge Tracker

Supply : Mains

Partial Discharge
Testing

Dual channel Partial Discharge locator with a colour touch screen interface for easy parameter adjustment and visual feedback. As standard it comes with two TEV or Capacitor coupled high frequency sensors and a hybrid TEV and ultrasonic sensor, contact type.

Other optional sensors that have been purpose designed for use with the PDT-120 are our airborne ultrasonic and high bandwidth HFCT sensors. Combined they provide a powerful and flexible PD analysis tool with the ability to determine PD location using varied sensing methods.

For ease of transportation the PDT-120 PD locator comes in its own carry case and separate accessories bag.

The carry case is ergonomically designed and comes with a neck strap for portability during field use.

UTILITY INSTALLATION & EDUCATIONAL EQUIPMENT

06

Education

Installation



PHASOR METER

Model : 633

Type : Phasor Meter

Supply: Mains

This instrument demonstrates the properties of phasors and real & imaginary number notation for students and engineers alike.

The 633 gives the phase displacement and magnitude of the parameter being investigated. It has 50 and 500V ranges and 1 and 10A current range including a 500V range reference voltage input.

Education

Installation



WATT & PHASOR METER

Model : 632A

Type : Watt and Phase Angle Meter

Supply : Mains

With voltage ranges of 50V, 160V and 500V and three current input ranges of : 1 Amp, 3.2A and 10 Amps this instrument has proven itself invaluable as a desktop tool for utilities world wide as well as an excellent laboratory asset in educational institutes.

Education

Installation



PHASE ANGLE METER

Model : 597C

Type : Phase Angle Meter

Supply: Mains

With voltage, direct current or current via clamp on CT the 597C is able to measure phase angle to an accuracy of 0.1 deg over a voltage range of 10V to 500V and 50mA to 50Amps via direct current measurement.

The clamp on CT option allows measurement of currents up to 500Amps.



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