

UTILITY TEST SOLUTIONS



RED PHASE INSTRUMENTS

PRODUCT CATALOGUE



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Delivering Test Solutions Reliably for 40 years.

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ince 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

Piura, Peru





INSTRUMENTATION

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/PT TESTING



C.T. & P.T. TESTING

Model : 590J-V2

Type : CT and Inductive PT tester

Supply : 110 to 250Vac

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 CT class accuracies or test points along with standards such as IEC 61869-2.
- Protection CT Testing.
- Inductive PT testing under burden and varying load voltage conditions as per IEC 61869-3.
- Multi-Tap CT test option available

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



OFFLINE CT TESTING



INSTRUMENTATION



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

**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



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.

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



Wonthaggi Australia

EARTH / GROUND SYSTEM TESTING

02

Red 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 / grounding system under current fault conditions can only be performed with a current injection source. This frequency adjustable current source simulates 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 / GROUND SYSTEM TESTING

CURRENT INJECTION

Model : 4061

Type : 200VA Current Injection unit with 4G / LTE connectivity and control

Supply : Mains supply, universal input

200VA INJECTION SYSTEM

Remote wireless control and status monitoring via mobile phone, tablet or PC.

The 4061 injection source injects current into an earth/ground loop at a pre-selected frequency from 40Hz to 200Hz.

The 4061 has 7 impedance tap settings to closely match typical earth loop impedances from 2 Ω up to 128 Ω. The 4061 automatically selects the most closely matched tap to the earth loop impedance so that as much power as possible is injected into the test loop at a constant rate. This gives the operator confidence that the clearest and most unambiguous results will be measured during potential and current branch tests.

For earth or ground loop impedances outside the 4061's existing impedance range, the power transferred into the test loop will be less than maximum but still sufficient for testing most small and medium subs or stations. Optionally the operator may consider our larger and more powerful 1.8kVA and 8kVA injection systems for larger or more inductively challenging environments which the test loop may be subject to.

The 4061 comes with an on board Web Server and data modem giving the operator the flexibility of remote control and status monitoring via their mobile phone or tablet. Also an in-built GPS feature together with our tunable multimeters allows the operator to take current branch phase angle readings without the need for a separate phase reference cable.

Whilst using the 4061 in a Fall of Potential set up, typical measurements taken by an operator with a tunable multimeter on-site would be:

1. Step & Touch Potentials
2. Transfer potentials
3. Touch Potential
4. Return current branches
5. Ground / Earth potential rise



Voltage Input Range	85 to 264 VAC
Output Power	200VA
Output Voltage Max	160VAC
Selectable Frequency Range	40Hz to 200Hz
Seven Earth / Ground Loop Transformer Impedance Taps	From 2 Ω at 10A to 128 Ω at 1.25A
GPS Phase Sync	Available
Remote Control	via Web Server



EARTH / GROUND SYSTEM TESTING

CURRENT INJECTION

1.8kVA INJECTION SOURCE

Model : 4062
Type : 1.5kVA to 1.8kVA Current Injection Unit
Supply : 85-264Vac, 50 or 60Hz

The 4062 is a switch mode current injection source that is used with the Model 4063 shown below to inject a true AC current at a selectable frequency into an earth/ground loop. Feedback control from the 4063 indicates to the 4062 what adjustment to the voltage magnitude is required to maintain the chosen RMS current. The 4062 comes with a GPS for injection signal synchronization together with an on board web server & 4G/LTE modem for remote injection status monitoring and control.



Output Power Max @ 240Vac	1800VA
Output Power Max @ 120Vac	1500VA
Selectable Frequency Range	40Hz to 70Hz
GPS Phase Synch	Yes
Remote Control	via Web Server

CURRENT INJECTION

1.8kVA COUPLING TRANSFORMER



Model : 4063
Type : 1.8kVA Coupling Transformer
Supply : Powered via 4062

The 4063 galvanically isolates the 4062 from the earth loop. To maximize output power, the 4063 has multiple output voltage and current taps to achieve the optimum impedance match between the load and the 4063. Note: The 4063 is designed for continuous operation at 1.8kVA.

Output Voltage Max	600Vac
Matched loop impedance outputs *	Eight, from 1 Ω at 42 A to 200 Ω at 3 A

* : 4063 transformer output taps can be customized

EARTH / GROUND SYSTEM TESTING

CURRENT INJECTION

Model : 4041

Type : 8kVA Current Injection Unit

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

8kVA INJECTION

SOURCE



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

CURRENT INJECTION

Model : 4043

Type : 8kVA Coupling Transformer

Supply : Powered via 4041

8kVA COUPLING

TRANSFORMER



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 / GROUND SYSTEM TESTING



MULTIMETER

**FREQUENCY
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

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

**FREQUENCY
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



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 / GROUND SYSTEM TESTING

LIGHTNING IMPULSE TESTER

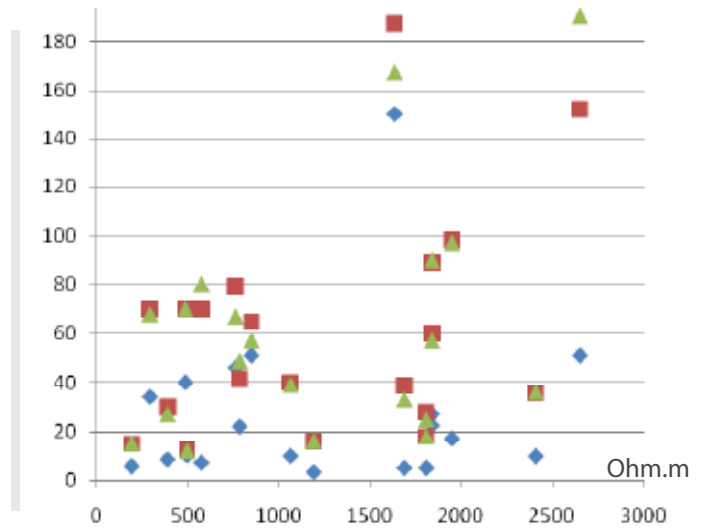
Model : 4051
Type : 32 Amp Impulse Impedance tester
Supply : 12V Rechargeable sealed lead acid battery

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 or earthed 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

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.



LIGHTNING IMPEDANCE TESTER



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



EARTH / GROUND SYSTEM TESTING

Equipment to Grid Testing

GRID BONDING TESTER

Model : ECT-4
Type : Continuity Meter for metallic 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 earthed or grounded system such as a substation. Such structures include the electrical equipment itself and peripheral elements such as the equipment guards and the sub or station's fencing.



The ECT-4 comes with a 10m/33ft and 100m/330ft extension cable allowing the operator to move the test probe to multiple test points around the grid. To extend, further extensions can be ordered in multiples of 100 metres or 330 feet. 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.

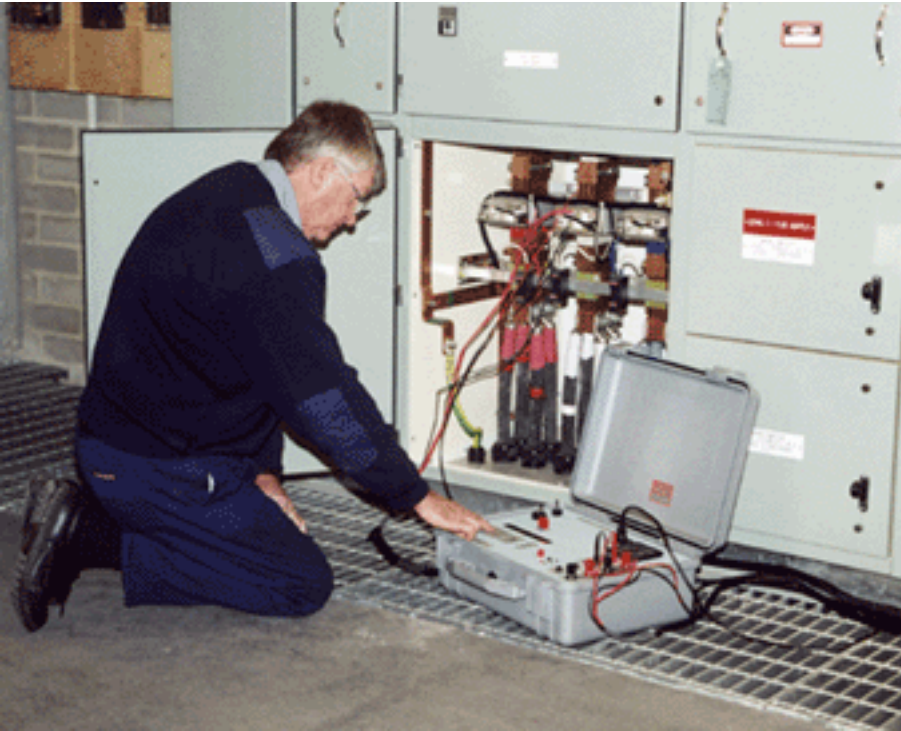
Output Voltage: Battery	14.4 Vdc
50Hz and 60Hz rejection	100dB
Selectable Current Levels	1 A, 2A and 3 Amps
Accuracy	± 0.05% w.r.t. full scale
Resistance Resolution	10uΩ from 0 to 0.2Ω
Resistance Resolution	100uΩ from 0.2Ω to 4.0Ω
Output Current Accuracy	± 2%
Current Stability	< 10ppm / second

Operating Current Modes:

- Forward D.C.: Continuous
- Reverse D.C.: Continuous
- Pulsed Cycle: Forward and Reverse



METER TESTING



The function of a revenue meter 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

METER TESTER

Model : 471

Type : Single Phase Meter Tester with 30A current source

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

SINGLE PHASE TESTER

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

SINGLE PHASE TESTER

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

R Model 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.



WH & KWH METER TESTING

METER TESTER POLY-PHASE TESTER

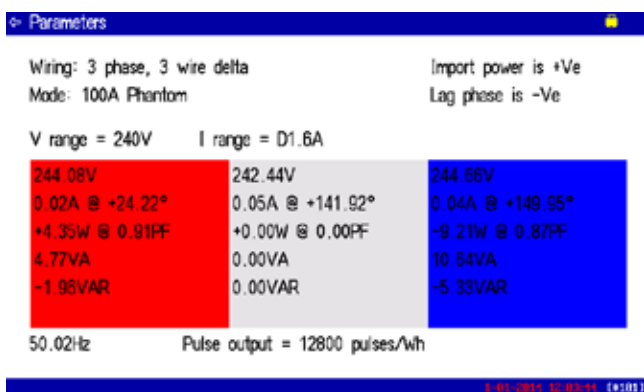
Model : 689B
 Type : 3-Phase KWH Meter Tester with 3 x 100A Current Source
 Supply : Mains or meter powered.

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.

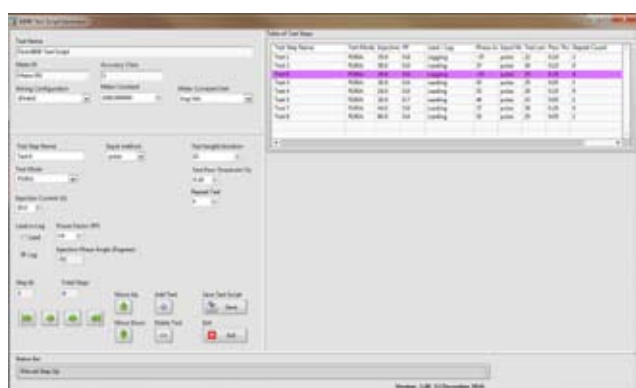


Max Direct Connect Current out	100 Amps
Max CT Connect Current out	10 Amps
Real Energy Accuracy	0.03%
VARH Energy Accuracy	0.15%

Colour Graphics display



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

**3-PH 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

**3-PH 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

**VOLTAGE AND
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 and heard 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 nor audible and occur within and around 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



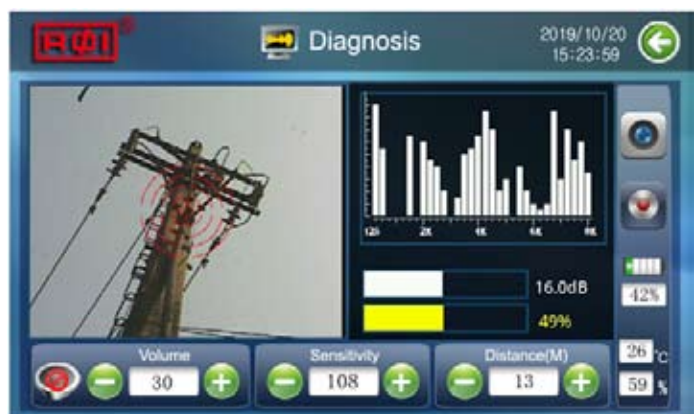
PD TESTER

Model : SUD-300
Type : Ultrasonic PD Detector
Supply : Battery

ULTRASONIC PD DETECTION

The SUD-300 is an ultrasonic detection and measurement instrument developed specifically to be used in the detection of Partial Discharge signals which have manifested in the inaudible ultrasonic frequency range. A light weight field instrument, it can locate, quantify and display the region of PD activity and its intensity in decibels and also translate the ultrasonic signal into the audio range to assist PD intensity detection.

This sophisticated ultrasonic detection system couples digital signal processing, image acquisition and powerful software to present the operator with a comprehensive signal analysis from which a sensible and cost effective equipment fault mitigation or replacement strategy can be determined and implemented.





Partial discharge location detection in a high voltage switch cabinet

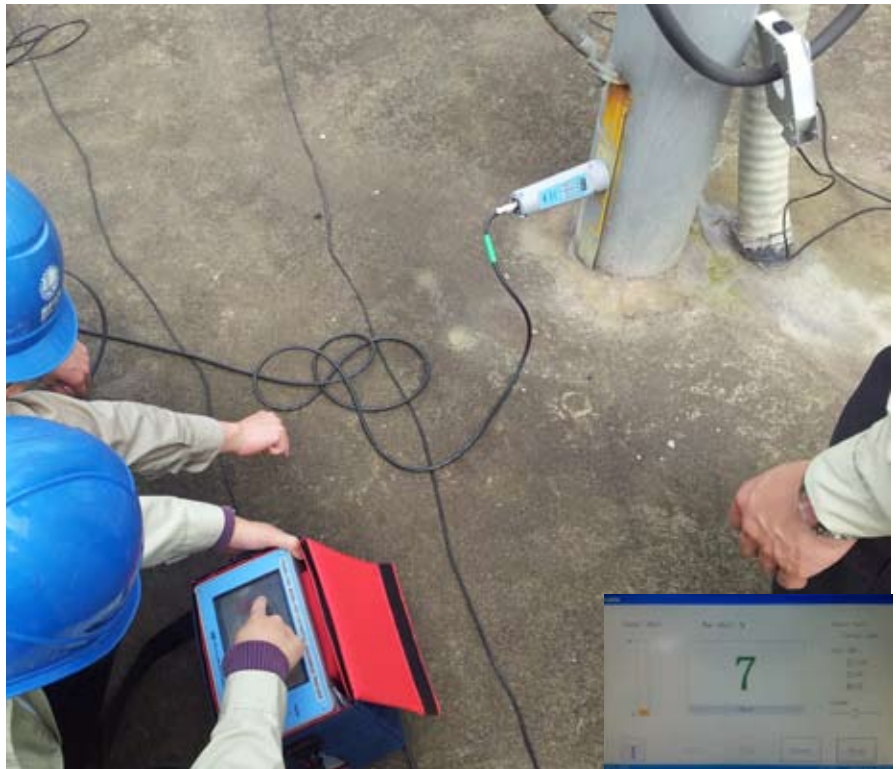
Switch cabinets contain high voltage elements such as break or make, control and protection equipment.

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



PD TESTER

Model : PDT - 120

Type : Partial Discharge Tracker

Supply : Battery

**TEV DISCHARGE
DETECTION**

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

EDUCATION
INSTALL



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
INSTALL



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, 3.2 AMPS and 10 Amps this instrument has proven invaluable as a desktop tool for utilities world wide as well as an excellent laboratory teaching asset in educational institutes.

EDUCATION
INSTALL



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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