

UTILITY TEST SOLUTIONS



RED PHASE INSTRUMENTS

EARTH SYSTEM TEST EQUIPMENT

CURRENT INJECTION SYSTEMS
FREQUENCY SELECTIVE MULTIMETERS
GRID AND METAL BONDING TESTER
IMPULSE IMPEDANCE TESTER



TABLE OF CONTENTS

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 providing 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**

| | |
|-----------|---|
| Page | TABLE OF CONTENTS |
| 4 | Earth Testing |
| | Product Areas |
| 5 | 200VA Injection System |
| | 200VA Frequency Selective Current Injection unit Model 4061- Current Injection System |
| 6 | 1.8kVA Injection System |
| | 1.8KVA Frequency Selective Current Injection system Model 4062 - Current Injection Source Model 4063 - Coupling transformer |
| 7 | 8kVA Injection System |
| | 8KVA Frequency Selective Current Injection system Model 4041 - Current Injection Source Model 4043 - Coupling transformer |
| 8 | Multimeters |
| | Frequency Selective Multimeters 4031-L- Hand Held Multimeter with LEM Connector for Lem Flex rogowski 4031-R- Hand Held Multimeter with LEMO Connector for large rogowski 4025E - Portable Multimeter with both a LEM and LEMO Connector |
| 9 | Lightning Impulse |
| | Portable Lightning Impulse tester used to measure impulse impedance response of Pylon footings |
| 10 | Grid Bond Testing |
| | Extremely portable bonding / continuity tester with up to 3 current levels and multiple current direction modes |



Wonthaggi Australia

EARTH TESTING

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 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 frequency tuneable 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 bond to the grid is determined with a continuity test at both D.C. and alternating D.C. levels.

200VA INJECTION SYSTEM

CURRENT INJECTION

Model : 4061

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

Supply : Mains supply, universal input

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 impedances outside the existing impedance range, the power transferred into the test loop will be less than maximum but still sufficient for testing most small and medium to large substations.

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 tuneable 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 tuneable multimeter on-site would be:

- Step Potential
- Ground / Earth Impedance
- Touch Potential
- Current splits / branching

EARTH SYSTEM TESTING

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



| | |
|--|-----------------------------------|
| Voltage Input Range | 85 to 264 VAC |
| Output Power | 200VA |
| Output Voltage Max | 160VAC |
| Injection 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 Synch | Available |
| Remote Control | via Web Server |



1.8KVA INJECTION SYSTEM

CURRENT INJECTION

Model : 4062

Type : 1.5kVA to 1.8kVA Current Injection Unit

Supply : 85-264Vac, 50 or 60Hz

EARTH SYSTEM

TESTING

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 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

Model : 4063

Type : 1.8kVA Coupling Transformer

Supply : Powered via 4062

EARTH SYSTEM

TESTING

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





8KVA INJECTION SYSTEM

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 tuneable multimeters allows the operator to take current branch phase angle readings without the need for a separate phase reference cable.

EARTH SYSTEM TESTING



| | |
|---------------------------|--------------|
| Output Power | 8000VA |
| Injection Frequency Range | 40Hz to 70Hz |
| GPS Phase Synch | Available |

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.

EARTH SYSTEM TESTING



| | |
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| 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



TUNEABLE MULTIMETERS



MULTIMETER

EARTH SYSTEM TESTING

Model : 4031-R and 4031-L

Type : Tuneable 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

EARTH SYSTEM TESTING

Model : 4025E

Type : Tuneable 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 |



LIGHTNING IMPULSE TESTER

IMPULSE TESTER

Model : 4051

Type : 32 Amp Impulse Impedance tester

Supply : 12V Rechargeable sealed lead acid battery

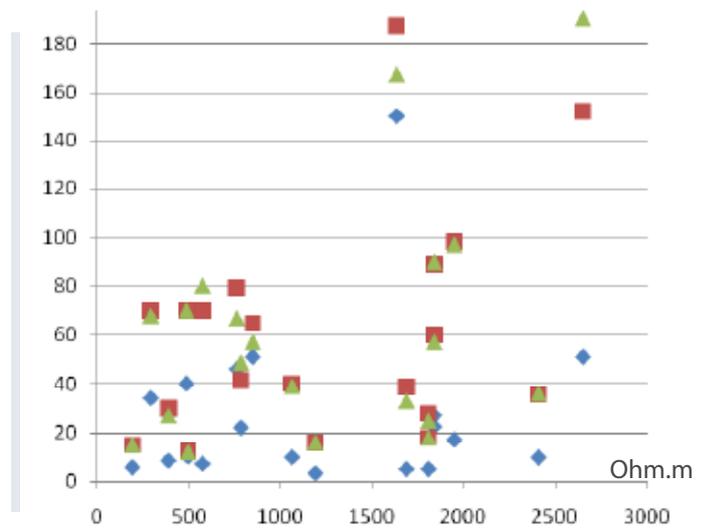
The lightning impulse impedance test instrument is used to measure the impulse ground impedance of a transmission pylon footing or other grounded structures without the need to disconnect the overhead ground conductor.

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: ▲

The following impulse profiles are available on the 4051 upon request: 1/20uS, 1.2/50uS, 4/10uS and 30/80uS



EARTH SYSTEM TESTING



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



GRID BOND TESTING

BONDING TESTER

EARTH SYSTEM TESTING

Model : ECT-4

Type : Equipment to grid bonding tester

Supply : Internal Lithium battery pack

External auxilliary battery pack available as option

The Model ECT-4 is used to test the continuity of connections of grid bonded structures within an earthed or grounded system such as a sub or station. Such structures include the electrical equipment itself, earth straps and peripheral elements such as the equipment guards and / or station fencing.



The ECT-4 comes with a 10m and 100m extension cable allowing the operator to probe multiple test points around the earthed or grounded system. Test length extensions may be ordered in multiples of 100m.

When running on its internal battery pack 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.

An optional external battery pack is also available for extended field use.

Other features:

The ECT-4 has a rugged ergonomic pistol grip probe for easy handling. The stainless steel probe pins retract when pressed onto a bonded metallic structure and the pointy durable tips makiew for easy 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, Reverse and Bipolar





AGENTS & DISTRIBUTORS

BRAZIL, Sao Paulo:
INSTRONIC INSTRUMENTOS DE TESTES LTDA.
Ph: 11 3383 3700, Fax: 11 3599 8222,
intl@instronic.com.br, www.instronic.com.br

CHILE, Valparaiso:
OMILEN Ltda.
Ph: 56-32-2724071, Cel:56-9-62099230
empresa@omilen.cl, www.omilen.cl

COLOMBIA, Bogota:
Producel Ingenieros S.A.
Ph: +57-1-6050101, Fax: +57-1-6375761
gerencia@producel.com, www.producel.com

EGYPT, Cairo
UMR-EMECO LTD
Ph: 002 02 2401 93 16 Fax: 002 02 2262 2817
umremeco@ie-eg.com

INDIA:
SM Systems
18, 2nd Floor, Mamta Anand Sankul,
Near Fame multiplex, Nashik Poona road,
Nashik Road, Nashik - 422 006 Maharastra, India
Ph: +91 253 2410497, +91 9960999900
sales@smsystems.co.in
http://www.smsystems.co.in

ISRAEL, Tel Aviv:
Wise Tech Ltd.
Ph: +972 (0)3 7703909, Fax: +972 (0)3 910 6050
sales@wise-t.co.il, www.wise-t.co.il

KENYA, Nairobi:
Equip Solutions.
Ph: +254-729-771-162
equip@e-quipsolutions.com

MAURITIUS Port Louis:
QUASAR CO. LTD.
Ph: +230 212531 7/8/9, Fax: + 230 212 5320
quasar@intnet.mu

NEW ZEALAND, Auckland:
ELECTROTEST LTD.
Ph: 09 448 2600, Fax: 09 448 2611,
info@electrotest.co.nz, www.electrotest.co.nz

PANAMA, Panama City:
TELCOMM & ENERGY S.A.
Ph: +507-3947216/15
ventas@telcomm-energy.com,
www.telcomm-energy.com

PARAGUAY, Asuncion:
SAS Impotaciones - Representaciones
Ph: +595 21 611921 R.A
sas@sas.com.py, www.sas.com.py

PERU, Lima:
ENERGETICA S.A.
Ph: +51 1 421 6566, Fax: +51 1 421 6536
energesa@energesa.com, www.energesa.com

PHILIPPINES, Manila:
AGP TRADING INC.
AGP Building 100 Conrado Benitez
Cnr Nicanor Jacinto Street,
BF Homes Paranaque, Manila
Ph: +632 842-0430, Fax:+632 807-6026
agptradinginc@gmail.com

SAUDI ARABIA,
AL-SAIDA TRADING EST..
Riyadh
Ph: +966 14503594, 4503596, Fax: +966 14503091,
minhaj@alsaida.com, www.alsaida.com

SOUTH AFRICA, Midrand:
WORLD TEST SYSTEMS.
Ph: +27 11 266 1572, Fax: +27 11 266 1884,
sales@worldtest.co.za, www.worldtest.co.za

SOUTH AFRICA, Randburg:
ELECTRO TEST INSTRUMENTATION CC.
Ph: +27 11 791 0577, Fax: +27 11 791 0555,
mwelectest@mweb.co.za

TURKEY, Istanbul:
TESTONE TEKNOLOJI COZUMLERI
Ph: 444 83 78, 444 TEST Fax: 0212 222 90 90,
bedriyed@testone.com.tr, www.testone.com.tr

URUGUAY, Montevideo:
DUO SUDAMERICANA SRL.
Ph: +598 2 400 81 26, Fax: +598 2 400 81 27,
duo@adinet.com.uy,

ZIMBABWE, Harare:
Fleischer Zimbabwe.
Ph: +263 4446086/7
Fax: +263 4446098
fleischeradmin@fleischerzim.com

Regional Sales Offices:

US & CANADA - NATIONAL SALES OFFICE:
RED PHASE INSTRUMENTS N.A.

Arizona
Contact: Michael Burles
Business Development Manager
info@redphase.us
Ph: 443 986 8482

SINGAPORE
RED PHASE PTE LTD:
Contact: Rajendra Kumar
7 Kenanga Ave,
Singapore - 348914
sales@redphase.com
Mob: +65 96904290



RED PHASE INSTRUMENTS

Address :

16 - 18 Ceylon Street
Nunawading, Victoria
AUSTRALIA 3131

Phone :

+613 9877 6988

Fax :

+613 9878 85081

Mail : sales@redphase.com.au

