



## Syscal R2

*Deep Resistivity/IP System*

### Features

- Powerful Resistivity System
- Entry Level IP System
- Up to 1900 W Power
- Output Current = 2.5A
- Output Voltage = 1600V peak to peak
- 20 Bit A/D Converter
- Compatible with Automated Electrode Switching System

### General

A unique configuration places the R2 in a class by itself. On one hand it is a powerful DC resistivity system that may be powered by external 12V or motor generator. On the other it is a very portable, easy to use IP system. In either mode it is a very accurate system featuring the Syscal two channel design that permits simultaneous measurement of both voltage and current.

The R2 system consists of three components; the combined transmitter/receiver unit; a DC/DC or AC/DC converter; and a power source, either 12 V battery, or motor generator.

The transmitter/receiver features a noise monitoring system for pre-induction control consisting of a DC digital voltmeter function. A line check/ground resistance measurement allows the operator to check that all electrodes are properly connected and grounded. Low

pass analog filters reduce the effect of higher frequency natural and cultural noise.

The R2 will monitor the input noise signal between the two receiving electrodes so that noisy conditions may be noted. At the start of each measurement the SP value is displayed. This value is also stored with each reading. SP compensation is automatic, with linear drift correction, using digital filtering. The SP value is recalculated at every third stack, which provides excellent correction of the SP drift.

The R2 has automatic gain ranging for both voltage and current. Digital stacking is used for noise reduction, with a maximum of 250 stacks. During stacking the operator can monitor either the instantaneous reading, or the cumulative average value.

Resolution after stacking is  $1\mu\text{V}$ . The standard deviation of each reading is also displayed and stored. The R2 calculates apparent resistivity based on the type of array and geometrical parameters that have been entered. Up to 1,000 readings may be stored. Data transfer is by serial link.

In the frequency mode the R2 has an output waveform of ON+, ON-. In the time domain mode, for resistivity and IP measurements, the waveform becomes ON+, OFF, ON-, OFF. Pulse duration may be set from 0.25-10 seconds.

The IP effect may be measured in four windows whose width, and delay time, may be programmed. The average value of the four chargeability windows is calculated and displayed during measurement. At the end of the measurement the chargeability for each window is displayed, and may be stored. Chargeability values normalized with respect to a standard decay curve can be displayed for the detection of EM coupling or noise effects.

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The second component of a Syscal R2 system is the power converter. This may be either a DC/DC converter, or a motor generator powered AC/DC converter. At the lower power range is a 125W DC/DC converter, powered by external 12V. With a marginal increase in weight the next step up is a 250W DC/DC converter that is still powered by a 12 V battery. The final step is a motor generator powered AC/DC converter with maximum 1,200W output. The third component making up the system is the power source itself, either 12V, or 220V; either battery or motor generator supplied.

The Syscal R2 is truly a unique system able to handle the deepest resistivity applications, to depths of 2,000 meters or more. It is also a very portable IP system suitable for many shallow mineral exploration programs. The R2 may be utilized with the Intelligent Node automated switching system.

## Specifications

### Power Sources

The Syscal R2 must be powered by an external DC source for ground energization. Available sources:

A 125W DC/DC converter supplied by a 12V battery. **Ranges:** 50V - 2.50A max, 100V - 1.25A max, 200V -0.62A max, and 400V - 0.31 A max. **Dimensions:** 17 x 21 x 28cm. **Weight:** 4kg.

A 250W DC/DC converter supplied by a 12V battery. **Ranges:** 100V - 2.50A max, 200V 1.25A max, 400V -0.62A max, and 800V - 0.31 A max. **Dimensions:** 31 x 21 x 21 cm. **Weight:** 5kg.

A 1200W AC/DC converter supplied by a 220V (or 110V) motor generator. **Ranges:** 50V - 1.5A max, 100V - 1.5A max, 200V - 1.5A max, 400V 1.5A max, and 800V -1.5A max. **Dimensions:** 43 x 29 x 32cm. **Weight:** 25kg.

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**Induced Polarization Measurements**

Beyond apparent resistivity, the Syscal R2 also measures resistivity using the Time Domain Induced Polarization (IP) parameter. The IP method is used in mineral exploration for the detection of massive and scattered mineralization.

A pulse-current waveform is transmitted (ON+, OFF, ON-, OFF) and the IP delay curve is analyzed with four changeability windows. The pulse duration (ON time), the delay time and the width of each individual window are programmable. The average value (M) of the four partial chargeabilities (Mi) is computed and displayed during measurement, while the four Mi values are available after measurement.

Chargeability values normalized with respect to a standard decay curve can be displayed for the detection of EM coupling or noise effects. With this versatile chargeability measurement, the Syscal R2 functions as both a resistivity meter and a low-weight, low-cost IP system for shallow mineral exploration.

**Measured Parameters**

Measurement and display of current, voltage, standard deviation, and SP

Computation and display of apparent resistivity for main electrode arrays: Schlumberger, Wenner, Gradient, and dipole-dipole.

Measurement and display of IP chargeability with four windows. Delay time and window widths individually programmable.

Display of noise level before measurement

Measurement and display of ground resistance (electrode check)

**Memory Operations**

Storage of data in the internal memory: Up to 1022 readings. Each reading includes current, voltage, SP, resistivity, chargeability, spacing, station number, etc.

Reading of data stored in the memory on the LCD display

Transfer of data to a computer (ASCII, binary files) through RS-232 serial link

Direct transfer of data to a printer

Remote control of the unit by a computer through the serial link.

**Transmitter**

Maximum output voltage: 800V (1600V peak to peak)

Maximum Output Current: 2A (2.5A in option)

Maximum Output Power: 1600W (1900W in

option)

External DC source for ground energization (DC/DC or AC/DC converters)

Output Current Resolution: 10µA. Accuracy. Standard 0.3%, max 1% from -20°C to + 70°C

Output Current Waveform: Frequency domain ON+, ON- for resistivity. Time domain ON+, OFF, ON-, OFF for resistivity and chargeability. Pulse duration (ON time) programmable from 0.25 to 10 s, with preset values of 0.5 s, 1 s and 2 s.

Thermal circuit breaker for overheating protection

**Receiver:**

Input Impedance: 10 Mohms

Input overvoltage protection

Input Voltage Range: - 5V to + 5V

Automatic SP bucking (-5V to + 5V) with linear drift correction up to 1 mV/s

50Hz and 60Hz power line rejection

Ground Resistance Measurement: 0.1 to 1,000kW

Voltage Measurement: Resolution: 1µV after stacking

A/D Converter: 20 Bit

Accuracy: Standard 0.3%, max 1% from -20°C to +70°C

Chargeability Measurement - Resolution: 0.

1mV/V Accuracy: 1% of displayed value for a voltage greater than 10mv

Continuous digital stacking up to 250 stacks

**Miscellaneous**

LCD display of 2 lines of 20 characters

Weather-resistant case

Dimensions: 31 x 21 x 21cm

Weight: 6kg, including dry cells

Power supply for electronic circuits: Six 1.5V D size dry cells. Over 300 hours operation at 20°C

External DC source for ground energization (DC/DC or AC/DC converters)

Operating Temperature Range: -20°C to + 70°C (Optionally -40°C to + 70°C)

Storage Temperature: -40°C to +80°C.

**Standard Components**

Syscal R2 console, battery charger, data transfer cable, software, transit case and instruction manual.

**Ordering Information**

Description	Order Number
Syscal R2 Resistivity Meter . . .	500-190-0003
125W Converter . . . . .	500-190-0006
250W Converter . . . . .	500-190-0009
1,200W Converter . . . . .	500-190-0012
Wenner Cable Set . . . . .	500-190-0016
Multi Electrode System . . . . .	500-190-0170
Sounding Cable Set . . . . .	500-190-0160
2.5 Amp Upgrade . . . . .	500-190-1132

