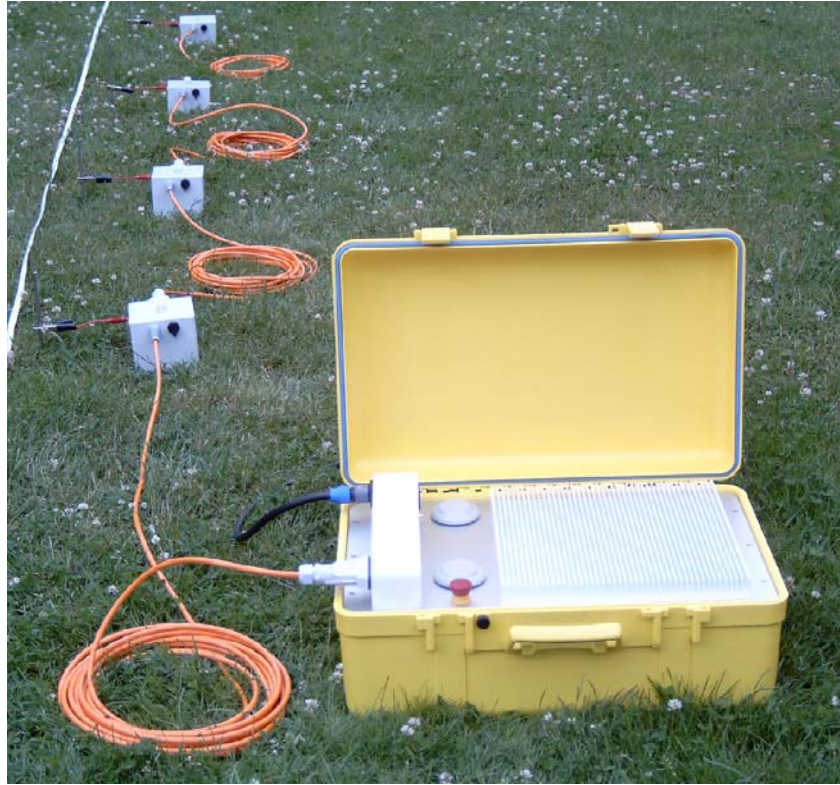


# SIP256C

• for productive 2-D and 3-D investigations on frequency-dependence of electrical resistivity of rocks and sediments

Spectral Induced Polarization

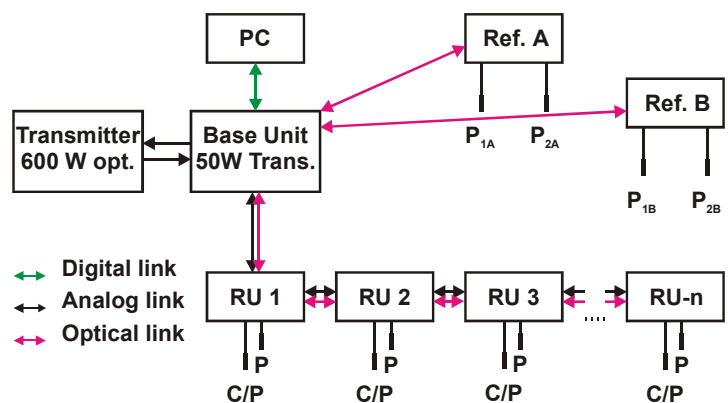
Geophysics



The **SIP256C** system measures the frequency-dependent complex resistivity (amplitude and phase) of soils over 6 decades of frequency. Due to the strong dependence on the pore structure the frequency-dependence can deliver important additional information for an improved discrimination and characterization of the subsoil. The multi-channel instrument is ideal for fast SIP measurements also in a noisy environment.

**SIP256C** equipment consists of:

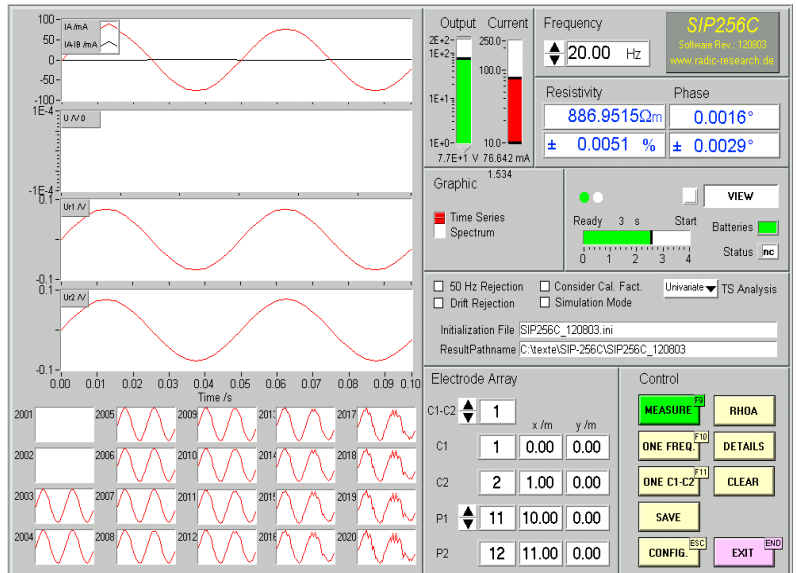
- base unit with build-in 50 W transmitter, signal generation, data management and timing
- 20-256 remote units (RU) for parallel current and voltage recording
- 2 remote reference units for parallel telluric noise recording
- PC software to control the whole system: data visualisation, processing, storage, -export
- an optional external 600 W transmitter



**SIP256C** schematic diagram

## OPERATING SOFTWARE

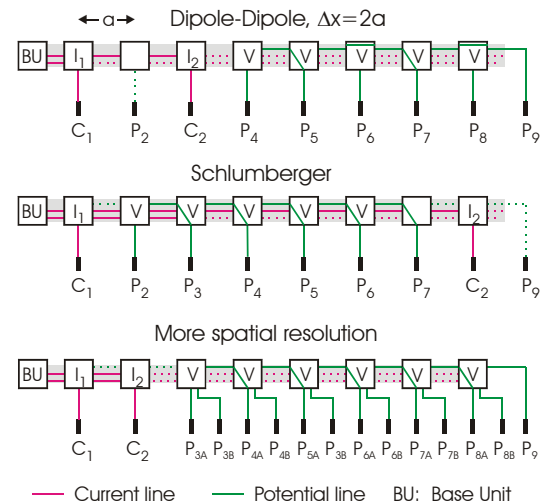
During the measurement the main menu of the PC (notebook) displays (real time) the recorded time series of current and voltages. This makes a first data quality check very easy. Recording starts at highest frequency. Thereby the recording time increases from a few milliseconds up to tens of minutes. Depending on the lowest measured frequency the acquisition of a complete spectrum takes from a few minutes ( $f_{\min}=1$  Hz) up to one hour ( $f_{\min}=1$  millihertz). A second quality check gives the confidence intervals of amplitude and phase displayed. The current is measured at both current electrodes. This allows to quantify and to reduce the unavoidable capacitive current leakage at high frequencies between the current cables and between each cable and the ground.



Main screen of PC operating program

## NEARLY ALL FIELD LAYOUTS ARE POSSIBLE

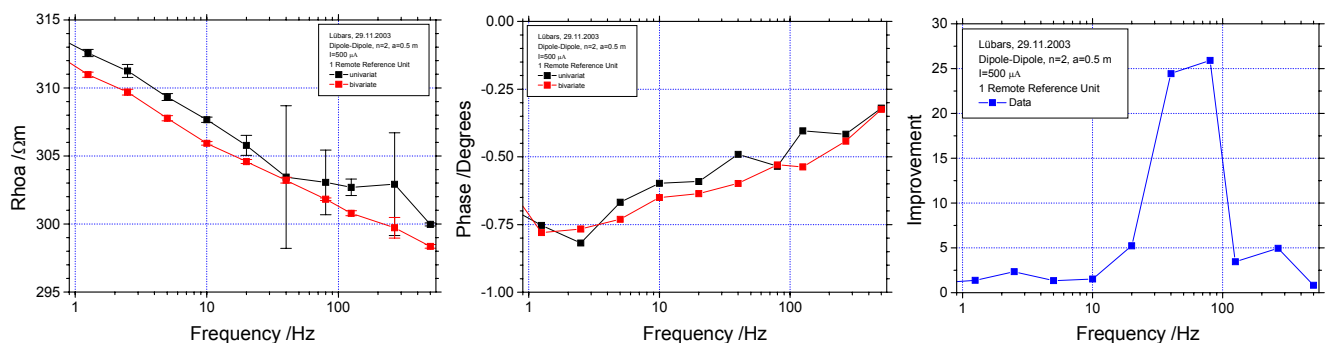
AC measurements make higher requests on the cables and the instrument than dc measurements. The cables of our **SIP256C** system are optimized for low cross coupling. Therefore, the user can design his IP measuring array almost as simple as for direct current measurements. Every remote unit can be used for current injection. Potential differences can be measured between neighboring as well as between distant electrodes. For this, two adjacent potential lines can be linked together.



Examples for field layouts

## FASTER MEASUREMENTS

Nearly all remote units can be used to measure the current or the voltages. This accelerates the measurements for minimum one order in comparison with other standard multi-electrode instruments, and also makes the instruments attractive, if „only“ dc measurements are wanted.



## GEOELECTRICAL REFERENCE TECHNIQUE

A multi-channel coherency analysis allows an identification and cancellation of external noise voltages. Soft- and hardware support up to 2 noise monitors which have to be placed in a distance of up to 200 m from the profile. Because of that the measurement error can be reduced to up to more than one order. The data set which is shown above was measured next to a dc powered railway line (Schönholz - Berlin). The new technique does not prolong measuring time.

## RANGE OF APPLICATIONS

- Humus
- Seashore
- Arable land
- Historical buildings
- Contaminated sites
- Archaeological sites
- Laboratory measurements
- Nuclear waste disposal sites
- Estimation of hydraulic permeability
- Groundwater exploration in arid areas
- Discrimination between clay and saline water
- Detection and characterization of electronic conductors



Base unit with 50 W transmitter



Base unit for Lab use



Remote unit



Remote reference unit



200 m remote control cable  
PC ↔ Base unit



Optional external  
600 W transmitter

## SIP256C

### Technical specifications

#### Base unit (with 50 W transmitter)

- Frequency range: 0.001 - 1000 Hz
- Signal shape: Sinusoidal
- Interface to RU string: 1
- Interfaces to RRUs: 2
- PC interface: 920 kbit/s (USB 1.2)
- Standard output power of build-in transmitter:  $\pm 250$  V,  $\pm 0.2$  A
- Interface to opt. external transmitter
- External 12 V battery 65 Ah
- Weight: 10 kg
- Size: 50 x 18 x 50 cm<sup>3</sup>

#### Remote units

- A/D converter: 24 bit
- Initial sample rate: 19.2 kHz
- Data rate: 3.2 kHz / 2<sup>n</sup>, n=0,1,2...15
- Input voltage range:  $\pm 2.5$  V
- Input current range:  $\pm 1.5$  A
- Buffer length: up to 250 k samples
- Data format: 32 bit
- Stacking: 1,2,4,8,...,256
- Digital power line filter
- Digital drift filter
- Socket 1: Metallic electrode for current feeding and voltage meas.
- Socket 2: Non-polarizable electrode
- Interconnection cable length: 0.5 - 40 m
- Battery capacity: ~10 h
- Water resistance: splash-proof
- Weight: 800 g
- Size: 12 x 12 x 12 cm<sup>3</sup>

#### Remote reference units

- Similar spec. as remote unit
- Voltage noise recording (field)
- Resistivity measurements on high resistive samples (lab)
- Optical cable length: 200 m
- Weight: 5 kg
- Case: Cable drum  $\varnothing$  23 cm

#### PC software

- Windows 98, 2000, XP, ME
- Control of the whole system
- Time series recording, storing, displaying, transfer function, confidence limits, exporting to commercial inversion programs

#### Optional external transmitter

- Frequency range: DC - 1000 Hz
- Maximum output:  $\pm 400$  V,  $\pm 1.5$  A
- Powered by: 230 VAC, 47-63 Hz
- Weight: 41 kg
- Plastic case size: 57 x 63 x 62 cm<sup>3</sup>

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