

Summary

- Measures field bulk density
- Measures dry bulk density
- Easy to use
- Real-time measurement
- Automatic depth reading
- Lightweight and rugged housing
- No licenses needed for usage or transport

Sensor

- CsI crystal radiation sensor
- ^{22}Na source
- Source is free to use
- No license or dosimetry badge needed
- Wireless connection via Bluetooth
- Battery-powered
- Measures ± 8 cm around sensor

Logging

- Data logging using an app
- Real-time control and data viewing using an app

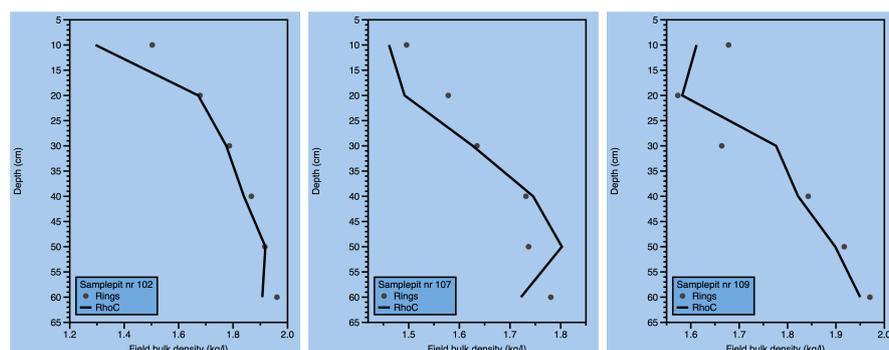
Application

The Medusa Radiometrics MS-RhoC5 measures soil bulk density in the field. Soil bulk density is an important physical soil health indicator and generally used for assessing soil quality. The MS-RhoC5 measures the backscatter of gamma radiation emitted from a (low-activity) source, which can be used without legislation. The sensor can measure up to 100 cm deep and only needs a hole of 30 mm diameter for such a measurement. With this sensor, there is no need for a soil pit or any laboratory work to determine soil bulk density, the sensor provides the measured densities during measurement in the field. This allows the soil scientist to gather more information in the vertical, as well as the horizontal scale.

The housing is rugged, easy portable and can be operated by any fieldworker.

System Operation

The patented system is designed for easy operation in the field. Before measurement, a small hole (30 mm diameter) should be drilled by a hand auger or other coring device. The sensor is placed in the hole up to the preferred depth. Guiding and fixing the position is made easy using the provided guiding mount. Data acquisition is done with an app on an Android phone or tablet. The app will assist in positioning the sensor by continuously displaying the actual depth, which is determined by the built in depth sensor. A measurement can be started from the app, and within 30 seconds, an accuracy of $\sim 0.01\text{g}/\text{cm}^3$ can be achieved. For correction to dry bulk density values, a model is used that incorporates moisture measurements from an internal capacitance-based moisture sensor. Positions of the measurements are stored automatically using the GPS inside the sensor. RTK accuracy can be enabled.



System Data

- *IP68 protection:
Ensures resistance
against dust and
water.*
- *Temperature use: -40
°C to +85 °C*
- *Charging with a
normal 5V (USB)
phone charger
12 hours of
continuous
measurement on a
single battery charge*

Housing

- *Titanium tube*
- *Dimensions: 30 mm \varnothing
x 1317 mm (L)*
- *Weight: 1.8 kilogram*

Technology

The system comprises a CsI scintillation detector connected to a tailor-made spectrum processing unit. The system is powered by an internal battery, that can be recharged with an USB adapter. The battery allows for over 12 hours of continuous measurement.

The unit communicates with an app that provides access to the multiple functions of the device, i.e.

- Project management to set-up the measurement locations;
- Constant displaying of the current depth;
- Settings to control the measurements;
- Starting and stopping the measurements;
- Live viewing of the field bulk density;
- Exporting the recorded data.

The system has been used for mapping field bulk density in various projects. Comparison with ring samples gives excellent results.

