



RK-1 Sensor Quick Start Guide

Your new RK-1 sensor is designed for use with the KD2 Pro system to measure the thermal conductivity and resistivity of hard materials like rock or cured concrete where a rotary hammer must be used to drill a hole to accommodate the sensor.

RK-1 Specifications

Operating Environment: -50 to +150 °C

Size: 3.96 mm diameter x 60 mm long

Range: 0.10 to 6 W/(m•K) (thermal conductivity)
17 to 1000 °C•cm/W (thermal resistivity)

Accuracy: ±10 % from 0.2 – 6 W/(m•K)
±0.02 W/(m•K) from 0.1 to 0.2 W/(m•K)

Cable length: 0.8 m

KD2 Pro firmware: KP 1.23.2 or greater

RK-1 Requirements

KD2 Pro firmware requirements

Before updating the firmware on your KD2 Pro, you will want to download any data stored on the controller. Updating the firmware will erase any data stored on the controller. Before updating the firmware you will want to update your KD2 Pro Utility software at <http://www.decagon.com/support/kd2-pro-utility/>.

Read time

The RK-1 sensor defaults to a 10 minute read time. The long read time helps to prevent errors caused by effects of the large diameter needle and contact resistance between the sensor and the test sample. This setting should not be changed except in special situations and only by expert users.

Power mode

The RK-1 sensor defaults to High Power Mode (HPM), and should generally be used in this configuration. One notable exception might be measurements in ice or frozen samples. It is especially important to use HPM in samples with high thermal conductivity (> 2 W/m•K).

RK-1 Best Practices

Pilot hole

In order to insert the RK-1 sensor into a hard concrete or rock sample it is necessary to use a 5/32" or 4 mm rotary hammer bit (included in the RK-1 kit) and a rotary hammer (not included) to drill a pilot hole in the material. Make sure to drill the hole as straight as possible and avoid "wallowing out" the hole. Also make sure to remove any dust or drill cuttings from the pilot hole using compressed air or a swab before inserting the RK-1 sensor. The sensor should slide easily into the hole with little or no gap between the sensor and sample if the hole is drilled and cleaned properly.

Thermal contact

The RK-1 sensor needs to make good thermal contact with the test sample for best accuracy. The use of thermal grease (included in the RK-1 kit) greatly improves the thermal contact. The best practice is to apply the thermal grease in the bottom of the pilot hole and allow it to squeeze back past the needle as it is inserted.

Thermal equilibrium

For best possible accuracy, the test sample should be at a stable temperature during the measurement, so sample temperature should be allowed to come into equilibrium with the surrounding environment before beginning the measurement. See the KD2 Pro User Manual for more details.

Accuracy verification

Accuracy verification for the RK-1 is similar to that for the SH-1 and TR-1 sensors that were included with your original KD2 Pro purchase. Place the RK-1 sensor in the black Delrin verification block that was included in your RK-1 kit and make a measurement, taking care to minimize temperature disturbances. The reading should correspond to the value recorded on the Certificate of Quality Assurance that was included in your RK-1 kit.