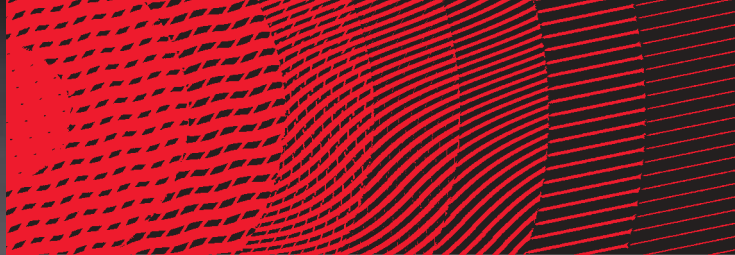




- Decagon manufactures easy-to-use instrumentation for the measurement of thermal properties: thermal conductivity, thermal resistivity, specific heat (heat capacity) and thermal diffusivity.

**Measuring Thermal Properties in the field or the lab has never been easier with the KD2 or KD2 Pro.**



- ◀ Thermal properties measurement of natural and engineered materials.

[www.thermal.decagon.com](http://www.thermal.decagon.com)



- ▲ Simplified solutions for complex thermal measurements.

**DECAGON  
DEVICES**

# KD2 Pro Complies with Published Standards



Below are the standards, the approved methods, and the specified needle dimensions.

The KD2 Pro TR-1 needle is 2.4mm in diameter and 100mm long. The KS-1 needle is 1.27mm in diameter and 60mm long.

## **AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM)** STANDARD D5334-00

This standard specifies a transient heated needle method.

1. Needles should be 100mm long, 1.8mm in diameter.

The Annex note A1.1 specifies that a shorter needle may be used. For soft rock samples, a shorter needle may be used. The needle length should not be less than 25.4mm to avoid boundary effects.

2. ASTM also recommends using thermal grease to provide better contact between the sample and the probe. Each KD2 Pro shipment includes thermal grease.

3. This method is the same as the transient line heat source (below) D5930-01.

## **AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM)** STANDARD D5930-01

This standard specifies a transient line heat source technique.

1. Needles should have a length-to-diameter ratio greater than 20.

2. This method is the same as the transient heated needle (above) D5334-00.

## **INSTITUTE OF ELECTRICAL & ELECTRONIC ENGINEERS (IEEE)** STANDARD 442-1981

This standard specifies a line heat source technique.

1. IEEE specifies two lengths of needles:

Field- 200cm long and 8mm in diameter

Lab- 100mm long and 2.4mm in diameter.

"The two techniques differ primarily in the size of the needle and portability requirements."

## **SOIL SCIENCE SOCIETY OF AMERICA (SSSA), METHODS OF SOIL ANALYSIS** PART 4 PHYSICAL METHODS 5.3

Thermal Conductivity pp 1209- 1226  
This standard specifies a line heat source technique.

1. "Line heat source probes use of thin needles made from stainless steel tubing roughly 1mm in diameter has proved successful."

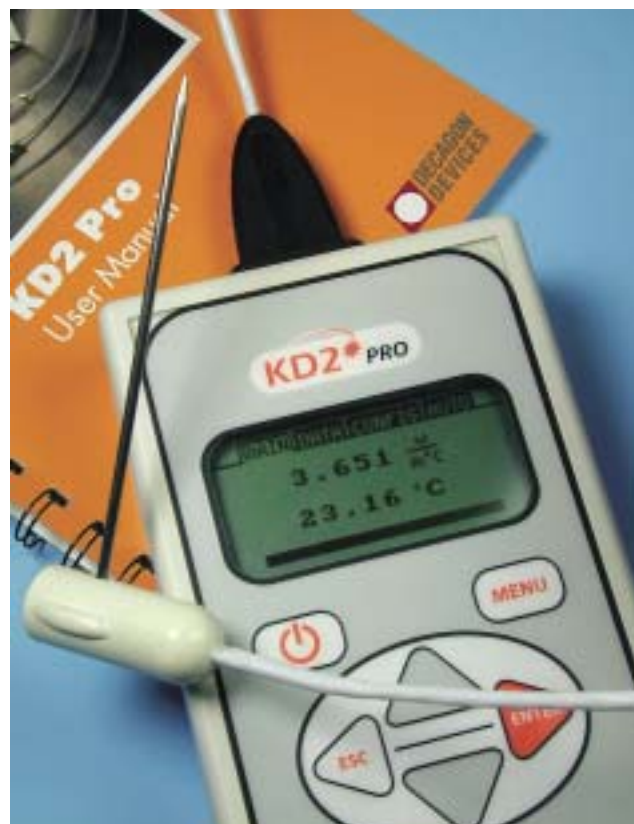
2. Typical lengths of the single probe vary from 3 to 25cm.





**T**he **KD2 Pro** uses three interchangeable sensors to measure thermal diffusivity, specific heat (heat capacity), thermal conductivity and thermal resistivity. Using the transient line heat source method, the **KD2 Pro** takes measurements at 1-second intervals during a 90-second measurement cycle. It then analyzes the data and corrects for sample temperature drift—providing accurate thermal properties measurements.

Users can read values directly or download raw values for analysis as required by IEEE and ASTM Standards. It also features an automated mode where users can set the measurement interval and collect unattended data. ■



**KD2 Pro Specifications**

**Measurement Time**  
90 Seconds

**Accuracy\***  
7% Specific Heat  
5% - 10% Thermal Conductivity/  
Resistivity  
5% Thermal Diffusivity

**Measurement Ranges\***  
K: 0.02 to 2 Wm<sup>-1</sup> C<sup>-1</sup>  
D: 0.1 to 1.0 mm<sup>2</sup>s<sup>-1</sup>  
R: 0.5 to 50 mC W<sup>-1</sup>  
C: 0.5 to 4 MJ m<sup>-3</sup> C<sup>-1</sup>

**Cable Length**  
0.8m

**Operating Environment**  
-50° to 150° C

**Case Size**  
15.5cm x 9.5cm x 3.5cm

**Data Storage**  
4095 readings, flash memory

**Power Requirement**  
4 AA Batteries

■ Each **KD2 Pro** comes factory calibrated and includes performance verification standards.



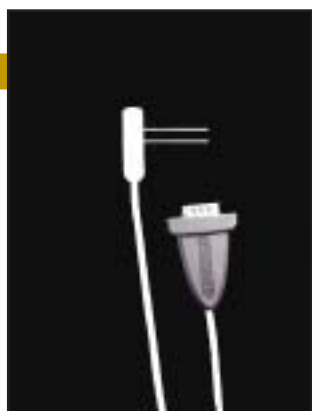
■ **KS-1**  
**6cm SENSOR**

The **KS-1** is ideal for measuring thermal conductivity and thermal resistivity. Conforms to ASTM Standard D5334-00. 60mm long, 1.27mm diameter



■ **TR-1**  
**10cm SENSOR**

The **TR-1** measures thermal conductivity and thermal resistivity and conforms to IEEE Standard 442-1981 and ASTM Standard D5334-00. 100mm long, 2.4mm diameter



■ **SH-1**  
**30mm Dual SENSOR**

The **SH-1** is the only sensor that measures thermal diffusivity and specific heat. 30mm long, 1.28mm diameter, 6mm spacing

\*Accuracy and measurement range vary with sensor type.

**KD2 Thermal Properties Analyzer**

**T**he pocket-sized **KD2** uses a single sensor to measure thermal conductivity and thermal resistivity. It uses the transient line heat source method to calculate and display the thermal conductivity in 90-seconds. The small needle size results in very little compaction during installation and allows for a short heating time—minimizing thermally induced drying around the probe. ■



■ The thermal conductivity of ice is not constant. It is a function of the rate of freezing.

**KD2 Specifications**

**Measurement Time**  
90 Seconds

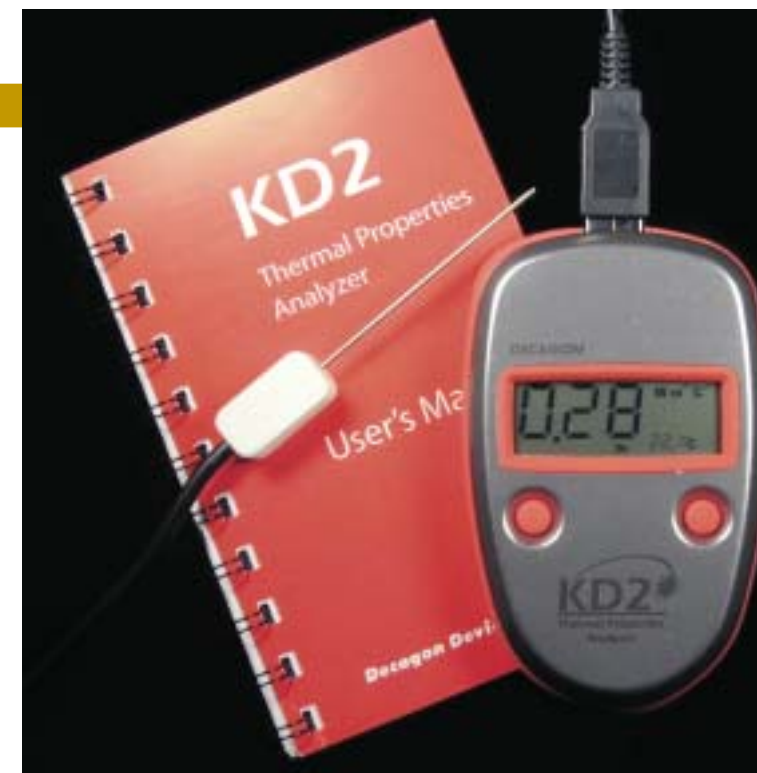
**Accuracy**  
5% Thermal Conductivity  
5% Thermal Resistivity

**Measurement Ranges**  
K: 0.02 to 2 Wm<sup>-1</sup> C<sup>-1</sup>  
R: 0.5 to 50 mC W<sup>-1</sup>

**Operating Environment**  
-20° C to 60° C

**Power Requirement**  
3.0 Volt Lithium Battery

**Sensor**  
60mm Length  
1.27mm Diameter



■ The **KD2** is ideal for fast measurement of thermal conductivity in a variety of solids and liquids.

