Hukseflux
Thermal Sensors

TNS02

Thermal needle set for thermal conductivity / resistivity measurement

TNS02 efficiently and accurately performs on-site (field) as well as laboratory measurements of the thermal conductivity and thermal resistivity of soils. The system is a combination of our FTN02 and MTN02 systems. Measurement with TNS02 complies with ASTM D5334 and IEEE 442 standards. It is designed for optimal flexibility. TNS02 includes two different needles; one on a short insertion tool for use in the laboratory, the other mounted on a long lance for use on-site.

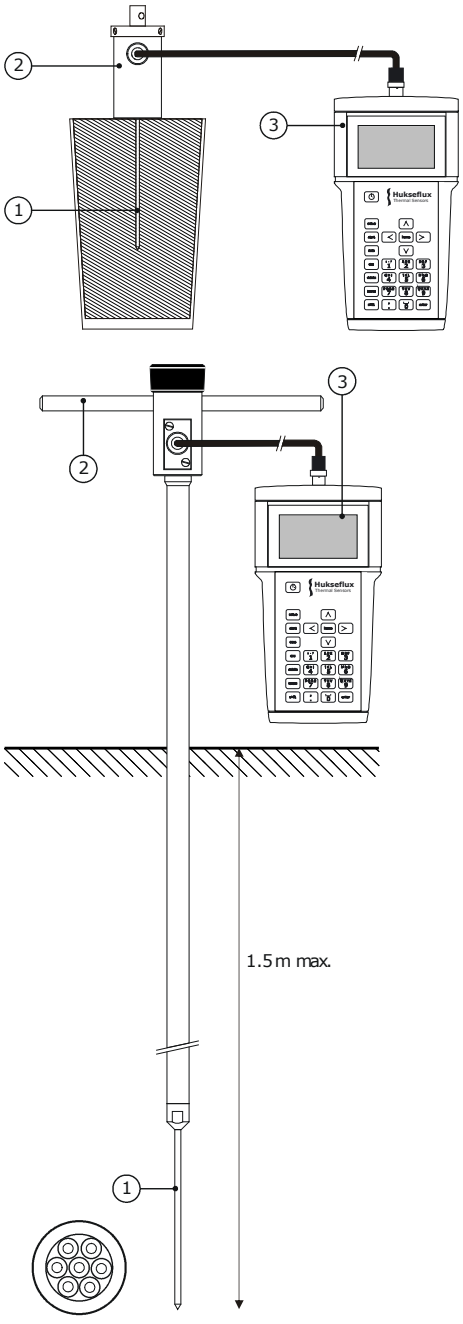

Figure 1 *TNS02 system in operation, combining the use of MTN02 for laboratory soil analysis (top drawing) and that of FTN02 in the field (bottom drawing).*

Introduction

TNS02 is a combination of our FTN02 and MTN02 systems. It allows efficient and accurate measurement of thermal conductivity and resistivity of soils, both in the field and in laboratory environments. The control and readout unit, CRU02, is shared between the two (on-site and laboratory) needle models.

system type	thermal needle	transport case	insertion tool
FTN02	TP09	TC01	LN02
MTN02	TP07	TC02	IT03
TNS02	TP09 + TP07	TC01	LN02 + IT03

Standards

Applicable standards are IEEE Guide for Soil Thermal Resistivity Measurements (IEEE Standard 442-1981(03)) and ASTM D5334-14 Standard Test Method for Determination of Thermal Conductivity of Soil and Soft Rock.

Suggested use

- route surveys, on-site (field) measurements
- laboratory analysis of soil specimens

Figure 2 *TNS02: Thermal needle TP07 with insertion tool IT03 for laboratory analysis of soil specimns. TP09 and lance LN02 are used for on-site measurements.*

Figure 3 *TNS02: CRU02 allows users to control the measurement using the keyboard and LCD display. Results are stored in CRU02's memory.*

Figure 4 *GT03 guiding tubes for use with TNS02.*

Figure 5 *A calibration reference cylinder type CRC05 for needle calibration. The CRC05 is not included in the standard TNS02. For TNS02 two cylinders are required: CRC04 and CRC05.*

TNS02 specifications

Measurands	-thermal conductivity -thermal resistivity -temperature
Measurement range	0.1 to 6 W/(m·K) (all common soils)
Rated operating temperature range	0 to + 50 °C
Measurement method	Absolute measurement per ASTM D5334-14 and IEEE 442-1981 (03)
Further specifications	See FTN02 and MTN02

See also

Hukseflux is specialised in thermal needle design. Alternative models are available at Hukseflux. Please consult the brochures of complementary systems MTN02 and FTN02. Please also look at TPSYS02, which is more accurate but has less robust needles.
We also provide separate solutions for measurements of sediment core samples and off-shore measurement at large depths (down to 3000 m). For insertion of TP07 in hard soils and for analysis of cements: guiding tubes of type GT03. For calibration there is the choice between calibration using glycerol or using calibration reference cylinders: for needles TP07 and TP09 calibration reference cylinders CRC04 and CRC05 are available.

Ordering

Please consult the product manuals. Send us an e-mail to get the latest versions.
Standard configuration is TNS02 (including LN02, IT03 and CRU02) + two TP07 + two TP09. (one spare needle of each type). TNS02 is delivered with its accessories in a practical transport case. Product training is available upon request.

About Hukseflux

Hukseflux Thermal Sensors, founded in 1993, aims to advance thermal measurement. We offer a complete range of sensors, systems and services for measuring heat flux, solar radiation and thermal conductivity.

Interested in this product?
E-mail us at: info@hukseflux.com