Terraplus
empowering discovery

your source for geophysical instruments

KT-20 Physical Property Measuring System

Magnetic Susceptibility • Conductivity • IP/Resistivity • Density

KT-20 Scan Mode

3F-32 Large Diameter Sensor

IP/Resistivity Module with Small Sample Holder

Outcrop Measurements

The KT-20 is a handheld console with different modules for measuring the magnetic susceptibility, conductivity, chargeability & resistivity, and density of a sample. Its modular design allows the KT-20 to be available in many configurations of measurement capabilities, and new modules or upgrades can be added at anytime. A range of sensors with different shapes and frequencies are available for the KT-20. Users can interchange the sensors on the console, allowing the KT-20 to be adapted to different sizes and types of samples, or used in various applications. The KT-20 console includes a number of built-in features to increase the amount of information that can be added to a measurement record. These features include a GPS receiver to obtain coordinates of the measurement, digital camera to photograph the sample, a microphone to record voice notes, and a virtual keyboard to enter text notes.

Benefits

- Three modes of operation: single measurement, continuous scanner, and borehole to correlate measurement results to their depth in the borehole.
- Multiple sensor frequencies and shapes to measure magnetic susceptibility and conductivity. Sensors are interchangeable to adapt the KT-20 to different samples or applications.
- Curved sensors dedicated for core logging.
- IP/Resistivity Module enables the KT-20 to measure the chargeability and resistivity of geological samples. The module comes with either a Small or Large Sample Holder to facilitate measurements for various sample sizes.
- 3F-32 Large Diameter Sensor for soil investigations, mapping, and detecting shallow anomalies.
- View data in real-time on the KT-20's large LCD screen. Stored records can also be reviewed directly on the console.
- Split and full core corrections for standard drill rod diameters (AQ, BQ, HQ, NQ and PQ) and non-standard sizes (2.4 cm to 12 cm) for circular and rectangular sensors.
- KT-20 console features built-in GPS receiver, digital camera, microphone and virtual keyboard for users to include additional information with measurement results.

Terraplus Inc.
120 West Beaver Creek Rd, Unit #15
Richmond Hill, ON, Canada, L4B 1L2

terraplus.ca
1.905.764.5505
sales@terraplus.ca

Terraplus
empowering discovery

your source for geophysical instruments

Applications

A modular design and interchangeable sensors give the KT-20 the flexibility to measure a wide variety of types and sizes of samples, or adapt the console for different applications.

- Drill Core – Curved sensors for measuring cylindrical core. Their unique shape permits the entire surface area of the sensor to make contact with the core sample, improving both the sensitivity and repeatability of the measurements. Use the IP/Resistivity Module to measure the sample's chargeability and resistivity.

- Prospecting – Use the KT-20 in the field for prospecting. Circular sensors are utilized for measuring large samples, like outcrop. The 10 kHz single-frequency circular sensor features a pin mode that aids in measuring samples with uneven, rough surfaces.

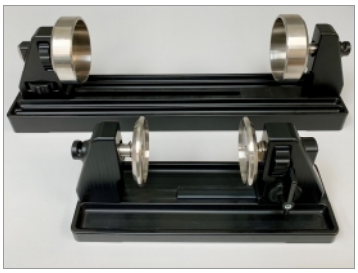
- Powders and Chips Samples – Use any circular or rectangular sensor to collect measurements on powders, rock chips and other loose samples. These types of samples should be formed into a bulk mass, with a surface area larger than the sensor, and at least 2-inches thick.

- Environmental Investigations – The 3F-32 large diameter sensor has a greater depth penetration than the single- and dual-frequency sensors. Use the 3F-32 to map soils, or in agricultural applications.

- Archaeology – The 3F-32 large diameter sensor is able to map the magnetic susceptibility and conductivity of soils, or detect shallow targets. Smaller sensors can be used to collect additional information on artifacts.

Curved Sensor Measuring Core Sample

IP/Resistivity Module with
Small Sample Holder



Small and Large Sample Holders
for IP/Resistivity Module

GeoView 2 Software

GeoView 2 is an easy-to-use data management and visualization software program that is compatible with all Windows operating systems.

It enables users to download, store and view a KT-20's data on a PC and export it to Excel. Data is organized by date, or by instrument serial number when there are data from multiple instruments. Additional information collected can be viewed in GeoView 2, including averaged readings, standard deviation, text and voice notes, pictures and GPS coordinates.

GeoView 2 is also a data visualization tool. Numerical values from discrete measurements are displayed in a table format; data from scanned and borehole mode measurements are displayed as a graph. Data from the borehole mode will show measurements from specific depths.

Borehole Mode Data in GeoView 2

Terraplus Inc.
120 West Beaver Creek Rd, Unit #15
Richmond Hill, ON, Canada, L4B 1L2

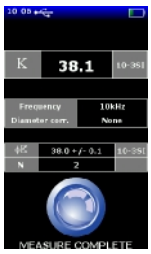
terraplus.ca
1.905.764.5505
sales@terraplus.ca

Terraplus
empowering discovery

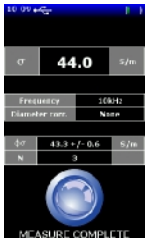
your source for geophysical instruments

Measurement Modules

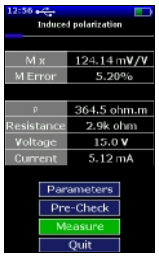
The KT-20 has four modules to measure magnetic susceptibility, conductivity, induced polarization (IP)/resistivity, and density. Magnetic susceptibility and conductivity can be measured simultaneously with circular or rectangular sensors, when both modules are activated. The KT-20 is available in any configuration, and all modules can be added to the console at a later date. Most upgrades can be completed through the internet, although a new sensor may be required. Sensitivities of the magnetic susceptibility and conductivity modules are dependent on sensor frequency and shape.



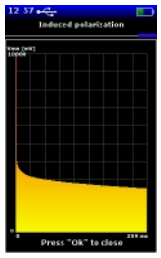
Discrete Magnetic Susceptibility Measurement



Discrete Conductivity Measurement



IP/Resistivity Measurement



IP Decay Curve

Density Measurement Result

Magnetic Susceptibility

- Measurement Range from 1 x 10^{-7} to 10 SI Units with Plus upgrade
- Plus upgrade for iron ore applications (see options section for details)
- Applicable sensors include 1/10 kHz dual-frequency sensors, 10 kHz circular sensor, 10 kHz curved sensors, and 3F-32 large diameter sensor. Sensitivity is dependent on sensor frequency and shape (see sensor section for details).

Conductivity

- Measurement Range: Dependent on sensor frequency and shape (see sensor section for details)
- Absolute conductivity meter, sensors are calibrated using multi-point algorithm
- Cx upgrade to increase conductivity measuring range (see options section for details)
- Applicable sensors include 10/100 kHz dual-frequency sensors, 10 kHz circular sensor, 100 kHz curved sensors, and 3F-32 large diameter sensor. Sensitivity is dependent on sensor frequency and shape (see sensor section for details).

Induced Polarization / Resistivity

- Calculates chargeability using 20 standard windows, with arithmetic, logarithmic, semi-logarithmic and Cole-Cole plotting options.
- Mx Fit calculation: an algorithm that calculates chargeability over several thousand data points increasing accuracy.
- Resistivity and resistance measured.
- Automatic voltage and current calibration.
- Total Tau.
- Pro upgrade to record full waveform analysis, raw data and more (see options section for details).
- Operators can choose between two sample holder sizes, Small or Large, dependent on the length and width of the samples being measured.

Density

- Enables the KT-20 to measure the density of a sample through water displacement. Includes a tensiometer, sample holder and water containment bag.

Terraplus Inc.
120 West Beaver Creek Rd, Unit #15
Richmond Hill, ON, Canada, L4B 1L2

terraplus.ca
1.905.764.5505
sales@terraplus.ca

Terraplus
empowering discovery

your source for geophysical instruments

Sensors

The KT-20 has a range of interchangeable sensors with different shapes and frequencies. Each shape and frequency has its own benefit or application. Users can swap sensors on the KT-20 to adapt the console to different sizes and types of samples, or for different applications.

Rectangular, Curved and Circular Sensor Shapes

Sensor Shapes:

- Circular Sensors: Ideal for measuring large, flat samples. 10 kHz single-frequency sensor features a pin mode to measure samples with uneven surfaces. Dimensions: 66 mm diameter.
- Rectangular Sensors: Used for measuring small, flat samples or split core. Dimensions: 65 mm x 38 mm
- Curved Sensors: Designed to measure drill core samples. Their curved shape allows users to achieve a higher sensitivity for magnetic susceptibility or conductivity, while producing consistent, repeatable measurements. Dedicated curved sensors for BQ, HQ, NQ and PQ sizes.

3F-32 Large Diameter Sensor

Individual Frequencies:

- 1 kHz: For measuring magnetic susceptibility on conductive samples. This frequency reduces the impact of conductivity on magnetic susceptibility measurements. This frequency is not suitable for measuring conductivity.
- 10 kHz: Ideal frequency for measuring both magnetic susceptibility and conductivity simultaneously. Single-frequency 10 kHz sensors offer highest sensitivity for measuring susceptibility.
- 100 kHz: Provides the highest sensitivity for conductivity measurements in low ranges. This frequency is not suitable for measuring magnetic susceptibility.

10 kHz Single-Frequency Curved Sensors for Magnetic Susceptibility

Sensor Sizes	Dedicated sensors for BQ, NQ, HQ, and PQ core sizes available
Operating Frequency	10 kHz
Magnetic Susceptibility Sensitivity	6 x 10^{-7} SI
Magnetic Susceptibility Measurement Range	0.0006 x 10^{-3} to 1999.99 x 10^{-3} SI
- Extended Range (Plus Option)	*0.0006 x 10^{-3} to 9999.99 x 10^{-3} SI*

100 kHz Single-Frequency Curved Sensors for Conductivity

Sensor Sizes	Dedicated sensors for BQ, NQ, HQ and PQ core sizes available		
Operating Frequencies	100 kHz		
	BQ Diameter	NQ & HQ Diameters	PQ Diameter
Conductivity Sensitivity	0.07 S/m	0.05 S/m	0.04 S/m
Conductivity Measurement Range	0.07 to 100 S/m	0.05 to 100 S/m	0.04 to 100 S/m

Terraplus Inc.
120 West Beaver Creek Rd, Unit #15
Richmond Hill, ON, Canada, L4B 1L2

terraplus.ca
1.905.764.5505
sales@terraplus.ca

Terraplus
empowering discovery

your source for geophysical instruments

Sensors

10 kHz Single-Frequency Circular Sensor

	Without Pin	With Pin
Operating Frequency	10 kHz	10 kHz
Magnetic Susceptibility Sensitivity	1 x 10^{-7} SI	1 x 10^{-6} SI
Conductivity Sensitivity	1 S/m	10 S/m
Magnetic Susceptibility Measurement Range	0.0001 x 10^{-3} to 1999.99 x 10^{-3} SI	0.001 x 10^{-3} to 1999.99 x 10^{-3} SI
- Extended Range (Plus Option)	*0.0001 x 10^{-3} to 9999.99 x 10^{-3} SI*	*0.001 x 10^{-3} to 9999.99 x 10^{-3} SI*
Conductivity Measurement Range	1 to 100,000 S/m	10 to 100,000 S/m

1 / 10 kHz Dual-Frequency Sensors

Available Sensor Designs	Circular or Rectangular	
Operating Frequencies	1 kHz	10 kHz
Magnetic Susceptibility Sensitivity	1 x 10^{-5} SI	1 x 10^{-6} SI
Conductivity Sensitivity	21.3 S/m	1 S/m
Magnetic Susceptibility Measurement Range	0.01 x 10^{-3} to 1999.99 x 10^{-3} SI	0.001 x 10^{-3} to 1999.99 x 10^{-3} SI
- Extended Range (Plus Upgrade)	*0.01 x 10^{-3} to 9999.99 x 10^{-3} SI*	*0.001 x 10^{-3} to 9999.99 x 10^{-3} SI*
Conductivity Measurement Range	21.3 to 100,000 S/m	1 to 100,000 S/m
- Extended Range (Cx Upgrade)	*21.3 to 200,000 S/m*	*1 to 200,000 S/m*

10 / 100 kHz Dual-Frequency Sensors

Sensor Designs	Circular or Rectangular	
Operating Frequencies	10 kHz	100 kHz
Magnetic Susceptibility Sensitivity	1 x 10^{-6} SI	-
Conductivity Sensitivity	1 S/m	0.1 S/m
Magnetic Susceptibility Measurement Range	0.001 x 10^{-3} to 1999.99 x 10^{-3} SI	-
- Extended Range (Plus Option)	*0.001 x 10^{-3} to 9999.99 x 10^{-3} SI*	-
Conductivity Measurement Range	1 to 100,000 S/m	0.1 to 15,000 S/m
- Extended Range (Cx Option)	*1 to 200,000 S/m*	-

3F-32 Large Diameter Sensor

Operating Frequencies	1 kHz	10 kHz	100 kHz
Magnetic Susceptibility Sensitivity	1 x 10^{-5} SI	1 x 10^{-6} SI	1 x 10^{-5} SI
Conductivity Sensitivity	1 S/m	0.1 S/m	0.05 S/m
Magnetic Susceptibility Measurement Range	0.01 x 10^{-3} to 1999.99 x 10^{-3}	0.001 x 10^{-3} to 1999.99 x 10^{-3}	0.01 x 10^{-3} to 1999.99 x 10^{-3}
Conductivity Measurement Range	1 to 10,000 S/m	0.1 to 10,000 S/m	0.05 to 10,000 S/m
Measurement Frequency:	· 4 readings per second, in stationary mode · 10 readings per second, in scan mode		

Terraplus Inc.
120 West Beaver Creek Rd, Unit #15
Richmond Hill, ON, Canada, L4B 1L2

terraplus.ca
1.905.764.5505
sales@terraplus.ca

Terraplus
empowering discovery

your source for geophysical instruments

Sensors

Induced Polarization (IP) / Resistivity Sensor

Parameters Calculated and Displayed	Chargeability, Error, Apparent Resistivity, Current, Voltage, Resistance	
Chargeability Resolution	10 µV/V	
Chargeability Precision	0.2%	
Voltage Resolution	10 µV	
Current Sensitivity	10 µA	
Transmitter:		
Signal Waveform	Time Doman (ON+, OFF, ON-, OFF)	
Pulse Duration	0.5, 1, 2, 4 and 8 seconds	
Current	Maximum 150 mA (electronically fused)	
Voltage	6V and 15V DC	
Contact Resistance:	50Ω to 5MΩ:	
	- 50Ω to 2MΩ @ 6V DC	
	- 100Ω to 5MΩ @ 15V DC	
Voltage and Current Calibration	Automatic	
Receiver:		
Voltage Resolution	10 µA	
Current Resolution	10 mA	
Early Delay Time	2 ms (Pro upgrade only)	
Sample Holders:		
Size	Small	Large
Length of Core/Sample	40 - 140 mm	50 - 350 mm
Diameter of Electrodes	70 mm	90 mm

Density Scale Assembly

Density Measurement:
Sample in Air

Density Measurement:
Sample Submerged in Water

Density Measurement Result

Terraplus Inc.
120 West Beaver Creek Rd, Unit #15
Richmond Hill, ON, Canada, L4B 1L2

terraplus.ca
1.905.764.5505
sales@terraplus.ca

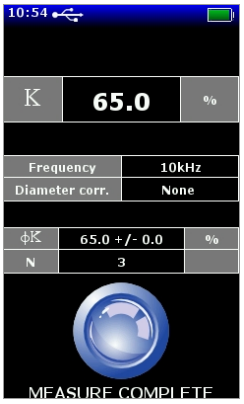
Terraplus
empowering discovery

your source for geophysical instruments

Options and Accessories

Instrument Upgrades

- Plus Upgrade for magnetic susceptibility module
  - Increase measurement range to 10 SI units
  - Iron ore concentration estimates (%) directly from the display for magnetite ore
- Cx Upgrade for conductivity module *(only available with 1 kHz and 10 KHz frequencies)*
  - Increase measurement range to 200,000 S/m
- Pro Upgrade for IP/resistivity module
  - Full waveform decay curve analysis using 16,000 data points
  - Initial chargeability (M ip) calculated
  - Decay analysis starting 2ms after switch off
  - Chargeability calculations from user defined time intervals (M User)
  - 3 time constants (Tau) calculated and 3 exponential decay models
  - Raw data recording
- Bar code option
  - Camera can be specifically tuned to read a variety of bar codes to facilitate archiving



Plus Option

Magnetic Susceptibility Calibration Pads [1]

Three calibration pads are available to recalibrate magnetic susceptibility measurements, or as a check source to confirm the readings - two for flat sensors and one for curved sensors. The curved calibration pad is available in BQ, NQ, HQ, or PQ diameters. The flat calibration pad with high values is only suitable for KT-20 consoles with the Plus upgrade.

	Flat		Curved
Approx. Nominal Susceptibility Values: *(values will vary between pads)*	Low Range	High Range	Low Range
	34 x 10^{-3} SI	2500 x 10^{-3} SI	95 x 10^{-3} SI


Flat Magnetic Susceptibility Calibration Pads

Conductivity Reference Pads [1]

Four reference pads are available to verify the KT-20's conductivity measurements - three for flat sensors and one for curved sensors. The curved reference pad is available in BQ, NQ, HQ, or PQ diameters. Each pad is independently tested using different methods for measuring conductivity (AC, DC and impedance bridges).

	Flat			Curved
Approx. Nominal Conductivity Values: *(values will vary between pads)*	Low Range	Medium Range	High Range	Low Range
	9 S/m	700 S/m	85,000 S/m	18 S/m


Curved Magnetic Susceptibility Calibration Pads

IP-T10 Reference Pad [1]

The IP-T10 is a dedicated reference pad to verify the IP/Resistivity Module's various measurement parameters and can be used with either the Small or Large Sample Holder. Shaped like a core sample, its housing is made from polished granite to minimize the influence of any surface contamination.


Flat Conductivity Reference Pads

[1] *Each calibration/reference pad includes a test certificate*

Terraplus Inc.
120 West Beaver Creek Rd, Unit #15
Richmond Hill, ON, Canada, L4B 1L2

terraplus.ca
1.905.764.5505
sales@terraplus.ca

Terraplus
empowering discovery

your source for geophysical instruments

Specifications

KT-20 Console Specifications

Memory:	16 GB
Data Input/Output:	USB and Bluetooth
Power Supply:	2 x Li-Ion Rechargeable Batteries
Operating Temperature:	-20°C to 60°C
Display Dimensions:	76 x 47 mm
Display Resolution:	400 x 240 pixels
Rating:	IP65
Maximum Sample Weight for Density Measurements:	1.0 kg
Size:	260 x 72 x 60 mm
Weight:	0.60 kg
Internal GPS Accuracy:	2.0m
Internal GPS Receiver Satellite Accessibility:	SBAS (WAAS, EGNOS, MSAS)
Built-in Camera :	2 Mega Pixels
Circular Sensor Dimensions:	66 mm
Rectangular Sensor Dimensions:	65 (L) x 38 (W) mm
Curved Sensors:	BQ, HQ, NQ & PQ sizes

Specifications are subject to change without notice (February 5, 2020)

KT-20 Contents

KT-20 Standard System Includes:
(1) KT-20 Console with:
- Digital Camera
- Transflective Colour Display
- Internal GPS Receiver

(2) Rechargeable Li-Ion Batteries with Charger
(1) USB Cable
(1) GeoView 2 Software on USB Stick
(1) Operations Manual with Quick Start Guide
(1) Rugged Transportation Case

KT-20 Contents in Shipping Case

Terraplus Inc.
120 West Beaver Creek Rd, Unit #15
Richmond Hill, ON, Canada, L4B 1L2

terraplus.ca
1.905.764.5505
sales@terraplus.ca