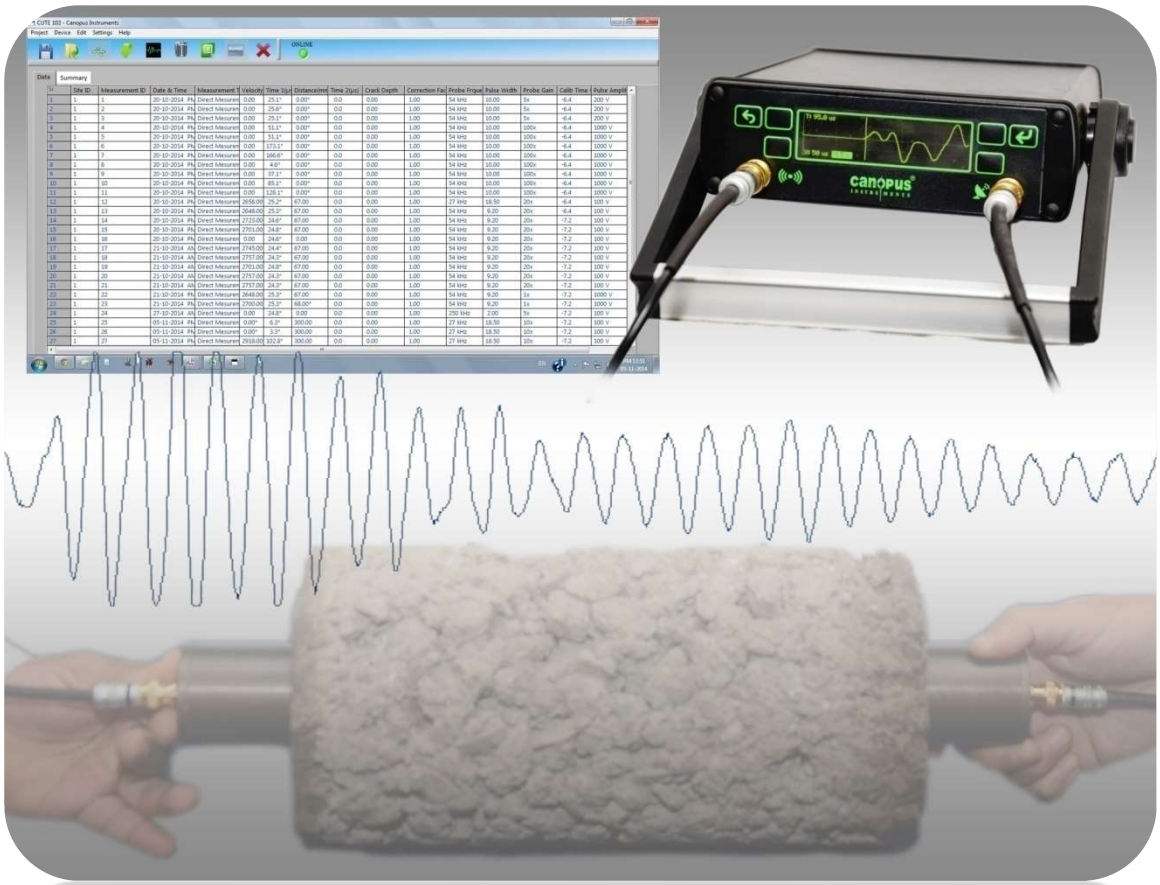
canopus INSTRUMENTS

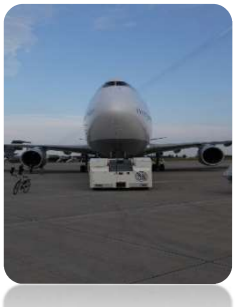
ULTRASONIC EQUIPMENT FOR NDT OF MATERIALS
Model: CUTE 103A



ULTRASONIC PULSE VELOCITY (UPV) MEASURING EQUIPMENT

MODEL: CUTE 103A

Designed for Low Frequency testing (<500KHz) NDT applications of Non-Homogeneous and other highly attenuating materials such as, Concrete, Rock, Ceramics, Graphite, Composites, etc.



COMPOSITES

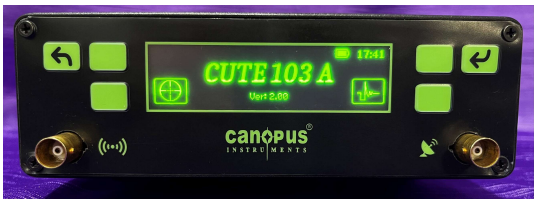
CONCRETE

GRAPHITE

WOOD

OVERVIEW

CUTE103A



CUTE103A is a Portable Ultrasonic Instrument designed for **Non-Destructive Testing (NDT)** of materials using **Ultrasonic Pulse Velocity (UPV)** measurement technique. The instrument is applicable for low frequency testing (< 500 KHz) of coarse grain materials and uses two Probe method (Tx/Rx) for testing, where the ultrasonic waveform generated by the transmitting probe is detected by the receiving probe and analyzed.

In addition to UPV measurement, CUTE103A offers **Ultrasonic Waveform** viewing & recording facility, which helps in observation of the **Attenuation** of the Ultrasonic signal in the material under test. Several advanced features are available for estimation of material characteristics such as **Elastic Modulus, Poisson's ratio, & Acoustic Impedance**. When used for testing Concrete, **Compressive Strength (σ)** estimation from measured UPV values can be done using curve generation algorithm in the PC based **CUTE103A-Connect Software** provided with the instrument.

The instrument is designed to comply with the recommendations of **BS EN 12504-4:2004, ASTM C597-71 (re-approved 1979) and IS 516 (Part 5/Sec 1): 2018**.

CUTE103A comes with our experience of over 25 years in design & manufacturing of Ultrasonic measuring instruments for material testing. CUTE103A design incorporates state of the art technology, several new features are added over earlier popular models, CUTE103 & CUTE102.

Features

- Designed for Non-Destructive Testing (NDT) of materials using two Probes (Tx/Rx) method.
- High Contrast Graphical OLED Display.
- Battery Backup: >6 Hours
- Small Size, Lightweight & Rugged Design
- Storage: up to 1000 Readings

Used for Low Freq. (< 500KHz) Testing of Non-Homogeneous & other coarse grain Attenuating materials for,

1. **Ultrasonic Pulse Velocity (UPV) Measurement.**
2. **Ultrasonic Pulse Attenuation Measurement.**
3. **Measurement of Crack depth**
4. **Estimation of Acoustic Impedance**
5. **Estimation of Elastic Modulus.**
6. **Estimation of Compressive Strength**
7. **Estimation of Poisson's Ratio.**
8. **De-Lamination Detection in Layered Composites.**

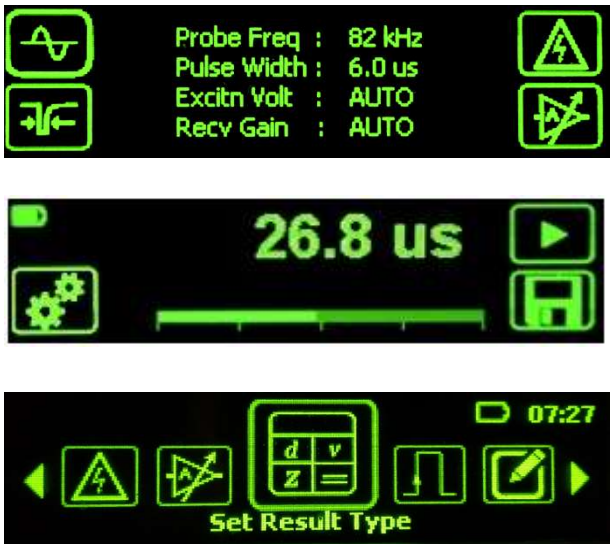
APPLICATIONS: -

Used for Non-Destructive Testing (NDT) of,

- **Concrete Structures**
- **Rocks**
- **Ceramics & Refractories**
- **Wood & Timber**
- **Carbon Composites**
- **Graphites, etc.**

FEATURES: CUTE 103A INSTRUMENT

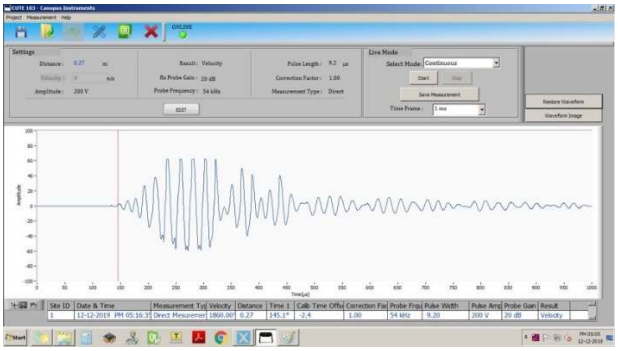
- Designed for Ultrasonic NDT of materials using two Probe (Tx/Rx) method.
- Advanced features help the user in identifying probe alignment & coupling quality by indicating signal strength.
- AUTO & Burst mode operation for ease of measurement to assist in quick testing for the Professional user.
- High Contrast Graphical OLED Display for easy viewing in outdoor conditions.
- Graphical Icons on the display help in easy operating navigation to the user.
- In-built re-chargeable battery gives long operational backup (> 6 Hours).



Graphical OLED Display

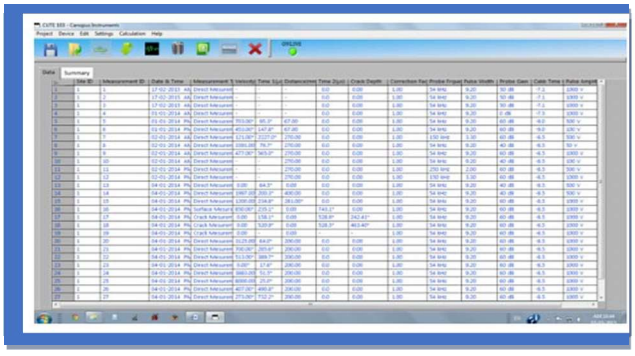
CUTE 103A CONNECT SOFTWARE UTILITY

- Windows based Software Utility provided for waveform viewing, analysis & storage in computer memory. A useful tool for research purposes.
- Waveform of the received signal can be viewed on the display during carrying out testing on site, thus highly useful in studying homogeneity of material under test.



Received Waveform Display

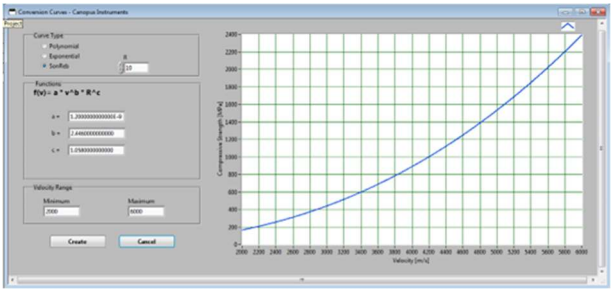
- Record & Storage facility for up to 1000 reading records, which are downloadable on PC for report generation.



Measurement Data Logging

❖ **Compressive Strength (σ) v/s UPV Curve**

a. **CUTE 103A S/W utility facilitates to draw either polynomial or exponential curves.**
b. **Curve generation by SONREB method using UPV & Rebound values.**



Compressive Strength (σ) V/S UPV Curve

Note:

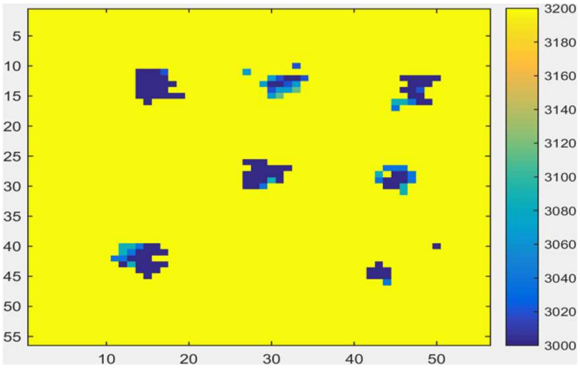
UPV Measured by CUTE 103A = v

User to provide values of Proportionality constants (a, b, c, d) and Rebound Number (R) as input parameters.

Curve Type	Equation
Polynomial	$a * v^3 + b * v^2 + c * v + d$
Exponential	$a * e^{b*v}$
SONREB	$a * v^b * R^c$

❖ **B SCAN Imaging.**
Imaging of subsurface defects using UPV values for Graphical Report generation.

Software developed with Technology Partnership of *CSIR-Central Building Research Institute, Roorkee, India*.



Concrete Slab Image Processed using UPV values

Why use CUTE 103A?

For the **Professional user**, the instrument provides easy to use Quick key interface to test and record UPV test readings at site in a short time. It is small in size, lightweight & comes in a rugged aluminium enclosure suited for rough handling at site. The Transducers are made smaller and lighter in weight to provide ease of handling. The in-built Li-ion battery gives battery backup time exceeding 6 Hours in continuous operation, which can be more than doubled during actual use as the instrument is operated only while recording readings. Thus, CUTE103A is a very handy test instrument for Professional NDT applications.

For the **Researcher**, the instrument provides several different test settings to carry out exhaustive testing procedures as demanded by the research work. Transducers of different Frequencies are available for specific needs. The USB interface along with **On-line** waveform viewing software package provides facility to view the test waveforms on a computer screen and SAVE them in a file, to be used with other software for further analysis in Time domain or Frequency domain. Thus, CUTE103A is an in-dispensable tool for research study of Non-homogenous and other Composite materials.

Description of CUTE 103A

CUTE103A uses through transmission of ultrasonic pulses to measure the time taken to travel in the material under test. The instruments consist of two transducer probes, which are used interchangeably as Transmitter & Receiver during Test. The transmitter generates pulses of ultrasonic frequency which are coupled into the specimen under test. The receiving transducer is used to detect these pulses & to coverts them back into electrical pulses. Suitable coupling media are used to minimize the losses due to acoustic mismatch at the transducer-specimen interfaces. An Quartz time base ensures accurate measurement of pulse transit time (T) with a resolution of 0.1µS.

Measurement log of max. 1000 readings can be stored in the instrument memory. Each reading is stored with ID no., Date, Time & other parameters set during test. Besides the use for basic measurement of Ultrasonic Pulse Velocity (UPV), the instrument can also be is used for checking uniformity of materials by observing the attenuation suffered by the Ultrasonic Waves during transmission by observing the receiver waveforms.

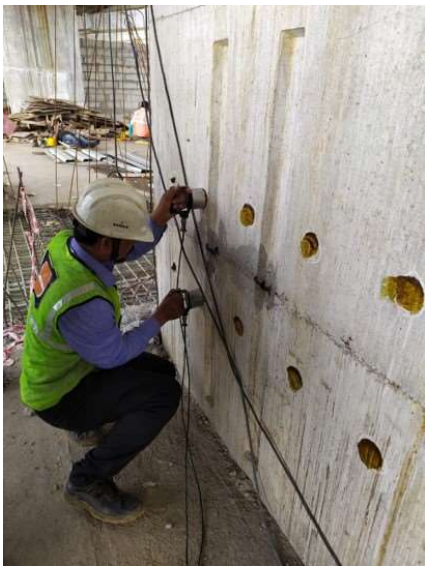
The waveform of the received signal can be viewed on the display during carrying out testing on site. These observations can help in estimation of compaction & uniformity of the material under test.

De-lamination studies on layered materials are also carried out by this method.

Canopus Instruments provides a Windows based Software Utility for communication of PC with the instrument using USB connection.

This Utility allows user the following options.

a. Download the measurement data stored in the instrument memory to the PC. This can be stored in File and can be Exported to EXCEL for report generation, trend analysis, etc.
b. Live View of Measurement Waveform on the PC screen for analysis. This can be stored in File and can be used with other software for further analysis in Time domain or Frequency domain



SURFACE PROBING OF CONCRETE WALL

CONCRETE COLUMN TESTING

SURFACE PROBING OF ROOF SLAB

CUTE103A is a fully portable model powered from external 5V DC adapter. It is provided with an Internal 3.7 VDC Li-ion Rechargeable Battery with in-built charger. Battery back-up time of more than 6 Hours is provided in continuous operation of the instrument. The battery icon on the screen indicates the battery charge level remaining so that the user is aware of the available back-up time during outdoor use.

The Green OLED graphical display provides good readability even in the presence of bright ambient light. Graphical Icons on the display help in easy navigation of the user, without using a manual, for setting the instrument parameters using tactile keypad on the instrument front.

A range of Transducer pairs ranging from 24KHz up to 500KHz are available for the user to choose depending on the application at hand. **Waterproof Transducers are available for under water testing applications.**

CUTE103A is small in size, lightweight & comes in a rugged cast aluminium enclosure suited for on-site use.

CUTE 103A APPLICATIONS: TESTING OF LARGE FOUNDATIONS

CUTE 103A

SPECIFICATIONS	
Method of Measurement	**Ultrasonic Pulse Transmission time measurement with two probes Tx & Rx (transducers) system.**
Measurement Parameters	**Display Mode Selection: Transit Time/Pulse Velocity/Path Length**
Display View (Selectable)	**Received Waveform, Measurement Log**
Computation of Parameters	**Elastic Modulus, Poisson's Ratio, Crack Depth Compressive Strength (CUTE 103A CONNECT Software)**
Time Base **Time Measurement Range** **Measurement Resolution**	**Quartz** **0000.0– 9999.9µS** **0.1µS**
Measurement Bandwidth	**20 KHz to 500 KHz**
Frequency of Transducers **Transducers Options Available**	**Standard Supply: 54KHz (P-Wave)** **P-Wave Transducers: 500KHz, 250KHz, 162KHz, 102KHz, 24KHz** **S- Wave Transducers: 62KHz**
Transmit (T_x) Pulse Amplitude Range (V)	**50, 100, 250, 500, 1000, AUTO** **(T_x Pulse Amplitude Set to Optimized value automatically in AUTO T_x Pulse Mode)**
Receiver (R_x) Gain	**Integrated Gain Stage: 0 - +60 dB adjustable in 1 dB Steps, AUTO (Gain Set to Optimized value automatically in AUTO Gain Mode)**
User Interface	**Green Graphic OLED Display (79X21 mm Passive matrix), Keypad**
Memory Storage	**Up to 1000 Readings can be stored in the Non-volatile memory**
Communication Interface	**USB 2.0 port**
Software Features **CUTE 103A CONNECT** **(Windows Based Software provided with the equipment for Analysis and Data Download)**	**1. Live view mode of waveform analysis. Display and Recording of Waveforms. FFT plotting.** **2. Measurement Log Download & Export to EXCEL file. Readings stored with Time Stamp.** **3. Estimation of Compressive Strength using curve fitting. Selection of curve type: Polynomial/Exponential/SONREB. (Note: User to provide values of Proportionality constants (a, b, c, d) and Rebound Number (R) as input parameters)**
External Trigger	**TTL level trigger (Max. rate 5 pulses/sec)**
Operator Adjustments	**a. Calibration using Calibration rod b. Parameter Settings like Excitation Voltage & Gain c. AUTO/MANUAL Operating modes d. Continuous/Burst Measurement mode (Refer Manual for details.)**

CUTE 103A

SPECIFICATIONS	
Electric Power Supply	5 VDC/4 Amp External Power Supply Adapter
Power Consumption	Electronic System: 5 Watts Electronic System + Battery Charging: 8 Watts
Internal Battery	Internal 3.7 VDC, 10400 mAH Li-ion Rechargeable battery.
Battery Backup Time	6 Hrs. Maximum
Operating Temperature Range Humidity Altitudes	0 to 55 °C. <95% RH, Non-condensing < 3000 mtrs.
Mechanical Details Size Weight Protection Class	Table Top / Hand Held Aluminium Enclosure W – 180 mm x H – 55 mm x D – 240 mm Main Instrument 2Kg Transducers: 54KHz – 500Gm X 2 = 1Kg. IP 42

Related Products

- ✓ Ultrasonic Pulse Velocity (UPV) Testing Equipment,
  Models: **CUTE102X0**
- ✓ Ultrasonic Testing Equipment with Tone Burst Capability.
  Model: **CUTE104A**

- ✓ Transducers Frequency Range
  : 24KHz – 500 KHz
- ✓ Immersion Transducers for Under Water Testing Applications
- ✓ NEW: Receiver Probes with In-built Pre-Amplifier (26dB Gain)

canopus® INSTRUMENTS

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MADE IN INDIA