canopus® INSTRUMENTS

# ULTRASONIC EQUIPMENT FOR NDT OF MATERIALS Model: CUTE 102 X0


## ULTRASONIC PULSE VELOCITY (UPV) MEASURING EQUIPMENT

## MODEL: CUTE 102 X0

**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

# CUTE 102 X0

## Overview

CUTE102 X0 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.

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.

Applications include estimation of properties of concrete such as Strength, Uniformity, Crack Depths, etc.

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.**

The CUTE 102 X0 comes with our experience of over 20 years in design and manufacturing of Ultrasonic Instrumentation products. Several new features are added over our earlier popular model CUTE102 and it incorporates state of the art technology in the design.

The CUTE102 X0 is offered as a base model of the CUTE series Instrumentation products. Its usage is primarily aimed at applications of UPV measurement on Coarse Grain materials.

For advanced usage, viz. Attenuation measurement, Waveform Analysis & Tone Burst Generation, the models CUTE103A & CUTE104A are recommended.


## Features

- Designed for *In-Situ* Non-Destructive Testing (NDT) of materials using Ultrasonic Pulse Velocity (UPV) measurement method.
- Applicable for NDT of Concrete from 0.1 m to thickness > 5 m (e.g. Bridges, Foundations, etc.)
- Applicable for Low Frequency (<500KHz) Ultrasonic NDT of non-homogeneous materials, e.g. Rock, Ceramics, Composites, Wood, Graphite, Rubber, etc.
- Continuous & 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.
- Record & Storage facility for up to 1000 reading records, which are downloadable on PC for report generation.
- In-built re-chargeable battery gives long operational backup (> 6 Hours). Advanced battery management algorithm incorporated.
- Microsoft Windows based Software Utility provided for records storage in computer memory.

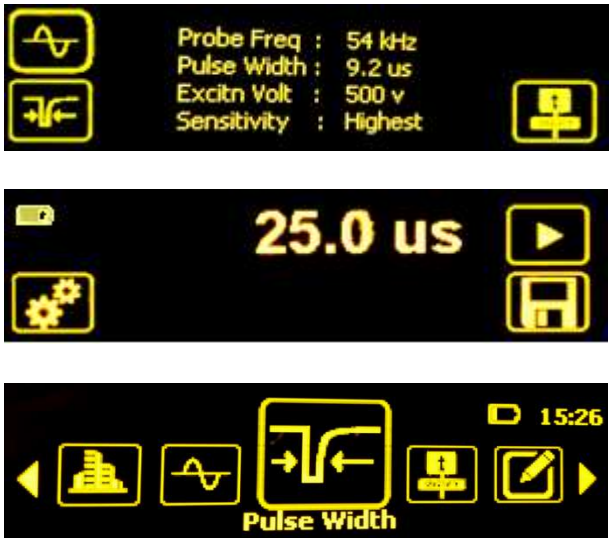
## APPLICATIONS: -

**Used for Ultrasonic Pulse Velocity (UPV) Testing of,**

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

## FEATURES: CUTE 102 X0 INSTRUMENT

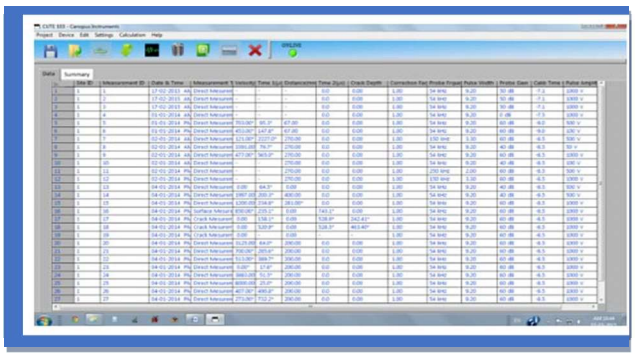
- Designed for Ultrasonic NDT of materials using two Probe (Tx/Rx) method.
- Burst mode operation for ease of measurement to assist in quick testing for the Professional user.
- High Contrast Graphical OLED Display for easy viewing in outdoor conditions.
- Graphical Icons on the display help in easy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




Graphical OLED Display

## CUTE 102 X0 CONNECT SOFTWARE UTILITY

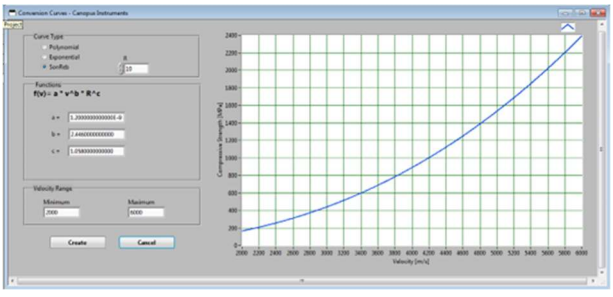
- Record & Storage facility for up to 1000 reading records, which are downloadable on PC for report generation.



Measurement Data Logging

- Compressive Strength (σ) v/s UPV Curve

  a. CUTE 102 X0 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 102 X0 = 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 | $a * v^b * R^c$ |

## Description of CUTE 102 X0

CUTE102 X0 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. A 10MHz 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.

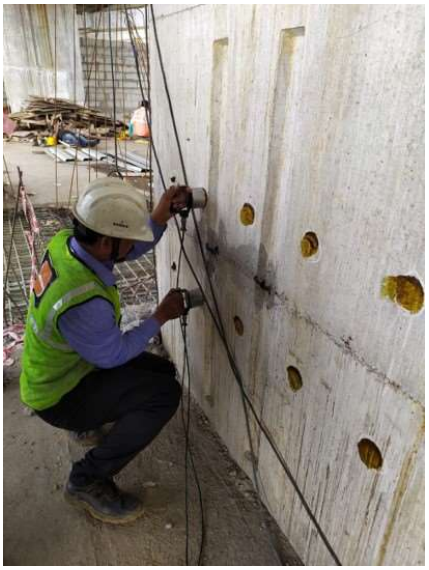
The Yellow OLED graphical display provides good readability even in the presence of bright ambient light. Graphical Icons on the display help in easy navigation of the user, without using a manual, for setting the instrument parameters using tactile keypad on the instrument front.

Canopus Instruments provides a Free Windows based Software Utility for communication of PC with the instrument using USB connection. This Utility allows user to 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.

CUTE102 X0 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.

CUTE102 X0 is small in size, lightweight & comes in a rugged plastic enclosure suited for on-site use.

A range of Transducer pairs ranging from 24KHz up to 500KHz are available for the user to choose depending on the application at hand.



SURFACE PROBING OF CONCRETE WALL

CONCRETE COLUMN TESTING


SURFACE PROBING OF ROOF SLAB

# CUTE 102 X0

| 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)** | **Measurement Log** |
| **Computation of Parameters** | **Crack Depth**<br>**Compressive Strength (CUTE 102 X0 CONNECT Software)** |
| **Time Base**<br><br>**Time Measurement Range**<br><br>**Measurement Resolution** | **10 MHz Quartz**<br><br>**0000.0– 9999.9µS**<br><br>**0.1µS** |
| **Measurement Bandwidth** | **20 KHz to 500 KHz** |
| **Frequency of Transducers**<br><br>**Transducers Options Available** | **Standard Supply: 54KHz (P-Wave)**<br><br>**P-Wave Transducers: 500KHz, 250KHz, 162KHz, 102KHz, 24KHz** |
| **Transmit ($T_x$) Pulse Amplitude Range (V)** | **500 V** |
| **Receiver ($R_x$) Gain** | **Integrated Gain Stage adjustable in 5 steps** |
| **User Interface** | **Yellow 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**<br><br>**CUTE 102 X0 CONNECT**<br><br>**(Windows Based Software provided with the equipment for Analysis and Data Download)** | **1. Measurement Log Download & Export to EXCEL file. Readings stored with Time Stamp.**<br>**2. 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)** |
| **Operator Adjustments** | **a. Calibration using Calibration rod**<br>**b. Parameter Settings: Gain adjustment**<br>**c. Excitation Pulse Width Setting**<br>**d. Continuous/Burst Measurement mode**<br>**(Refer Manual for details.)** |

# CUTE 102 X0

| SPECIFICATIONS | |
|---|---|
| Electric Power Supply | 5 VDC/4 Amp External Power Supply Adapter |
| Power Consumption | Electronic System: 5 Watts<br>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<br>Humidity<br>Altitudes | 0 to 55 °C.<br><95% RH, Non-condensing<br>< 3000 mtrs. |
| Mechanical Details<br>Size<br>Weight<br><br>Protection Class | Table Top / Hand Held Plastic Enclosure<br>W – 160 mm x H – 65 mm x D – 260 mm<br>Main Instrument 1.5Kg<br>Transducers: 54KHz – 500Gm X 2 = 1Kg.<br>IP 42 |

**Related Products**

- ✓ Ultrasonic Pulse Velocity (UPV) Testing Equipment,
  Model: **CUTE 103A**
- ✓ 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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