

Mastrad Limited

Mastrad Limited
Victory House, Prospect Hill
Douglas, Isle of Man IM1 1EQ UK
Tel: +44 1624 679630
Fax: +44 1624 679631
Email: sales@mastrad.com
Web: www.mastrad.com

PUNDIT® PL-200

ULTRASONIC PULSE VELOCITY

PUNDIT® PL-200PE

ULTRASONIC PULSE ECHO





PUNDIT® TOUCHSCREEN UNIVERSAL

– History of Innovation since 1954

Founded in 1954, is a leading manufacturer of the highest quality portable instruments for non-destructive testing of materials. The ubiquitous Original Schmidt concrete test hammer and the patented SilverSchmidt (Q-value)

Industry Standard Pundit

Pundit is a de facto industry standard brand and widely recognized as the first commercial field (on-site) device to measure Ultrasonic Pulse Velocity. The Pundit in 2009 and later launched the popular Pundit Lab and Pundit Lab+.

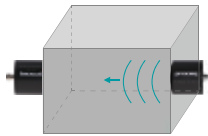
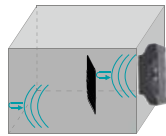
New Pundit Touchscreen

The **Pundit PL-200** and **Pundit PL-200PE** continue the illustrious Pundit tradition that began in the 1970s. They are the first products to be developed using a new generation and design-protected Touchscreen Unit.



- ✓ Housing specially designed to be used on-site in harsh environments
- ✓ Screen with highest resolution and sharpest image available in the market allowing best possible analysis of the measured waveforms
- ✓ 8 GB Flash memory allowing storage of up to 100'000 A-Scans
- ✓ Dual core processor supporting diverse communication and peripheral interfaces
- ✓ Modular concept: Expandable with all Pulse Velocity and Pulse Echo transducers
- ✓ Future proof investment: upcoming Pundit ultrasonic products will be directly compatible

Applications Overview

| Pundit PL-200 | Pundit PL-200PE |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Through Transmission: Access from two sides | Pulse Echo: Single side access |
|  |  |
| Assessment of Concrete Quality | |
| Ultrasonic Pulse Velocity | |
| Uniformity | |
| Compressive strength and SONREB | Slab thickness from a single side |
| Determination of crack depth | Detection and localization of voids, pipes, cracks (parallel to surface), and honeycombing |
| Modulus of elasticity | |
| Scan Modes | |
| A-Scans Line Scans E-Modulus Data Logging Area Scan | A-Scans B-Scans Area Scan |

- ✓ Never before has the user had such a control over the measurement procedure in real time directly on-site!



PUNDIT® PL-200

ULTRASONIC PULSE VELOCITY

Pundit PL-200 – The new Benchmark for Ultrasonic Pulse Velocity Testing

Best-in-class Ultrasonic testing instrument providing superior features for on-site testing:

- ✓ Line Scans and Area Scans for concrete uniformity assessment
- ✓ Zoom and scroll for precise A-Scan inspection
- ✓ On board storage and review of waveforms
- ✓ Settings directly accessible on measuring screen
- ✓ Dual cursor for manual A-Scan evaluation
- ✓ Separate cursor to measure signal amplitude
- ✓ Improved surface velocity measurement
- ✓ Automatic and manual triggering and user adjustable trigger threshold
- ✓ A-Scan update rate up to 40 Hz
- ✓ Expandable with Pundit Pulse Echo transducer



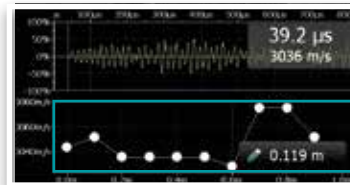
Ordering Information Pundit PL-200

Part Number: 327 10 001

Consisting of: Pundit Touchscreen, 2 Transducers 54 kHz, 2 BNC cables 1.5 m, couplant, calibration rod, BNC adapter cable, power supply, USB cable, DVD with software, documentation, carrying strap and carrying case

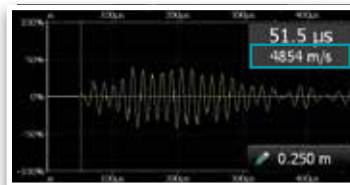
Comprehensive Measurement Modes

Line Scans



Assesses the concrete uniformity and detects cracks as well as other defects. The measured pulse velocities are displayed as a line.

Pulse Velocity



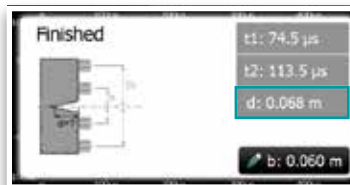
Calculates the pulse velocity of the material under test.

Compressive Strength



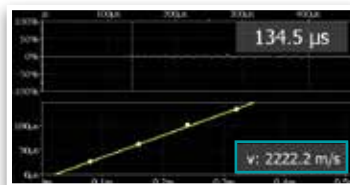
Determines the compressive strength using Ultrasonic Pulse Velocity correlation, or by using SONREB.

Crack Depth



Determines the depth of perpendicular cracks according to BS 1881.

Surface Velocity



Determines surface velocity according to BS 1881.

Transmission Time: Measures the transmission time.

Distance: Calculates the distance between the transducers.

Standards and Norms: EN12504-4 (Europe), ASTM C 597-02 (North America), BS 1881 Part 203 (UK), ISO1920-7:2004 (International), IS13311 (India), CECS21 (China).

PUNDIT® PL-200

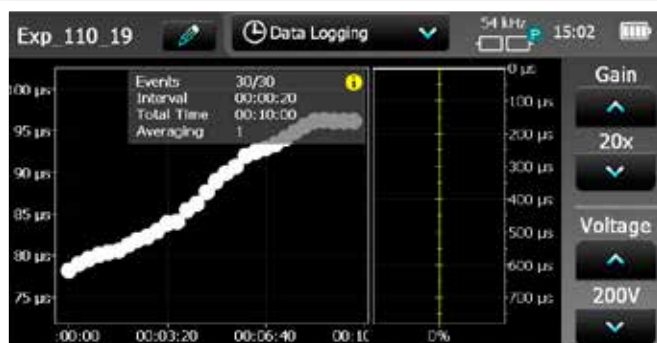
ULTRASONIC PULSE VELOCITY

Additional Measurement Modes

E-Modulus

Determine the dynamic E-Modulus of a material (e.g. concrete or rock) by measuring P- and S-wave pulse velocities.

- ✓ Direct calculation of the E-Modulus on the instrument
- ✓ Measure P- and S-wave velocities on the same screen (Dual Cursor)
- ✓ Poisson's Ratio also calculated on PL-Link software



Data Logging

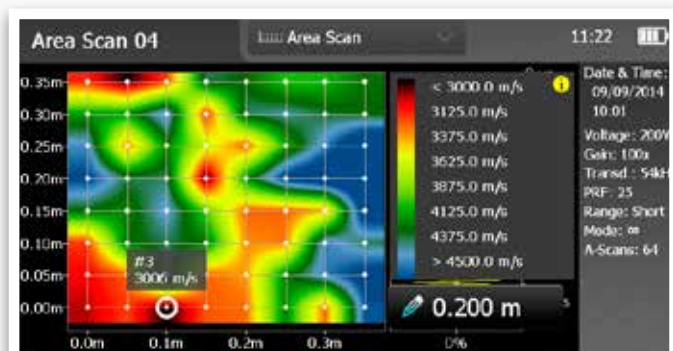
Set up automated test sequences for long term measuring applications.

- ✓ Countdown timer indicates time to next measurement
- ✓ Pulse velocity development shown graphically on screen

Area Scan

2D-visualization for uniformity testing on structural elements.

- ✓ User definable colour classification based on pulse velocity or transmission time
- ✓ User definable grid pattern for small to large scale measurements
- ✓ All measurements can be edited (deleted, re-measured)

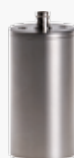







PUNDIT® PL-200

ULTRASONIC PULSE VELOCITY

Pulse Velocity Transducers

offers an extensive range of transducers providing highest accuracy and a proven field track record. The selection of the correct transducer is dependent on the aggregate/grain size and the dimensions of the test object.

| Bandwidth and aperture size | Test Object Limitations | | | Applications | |
|----------------------------------|-------------------------------------------------------------------------------------|--------------------|---------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| | Wavelength* | Maximum grain size | Minimum lateral dimension | | |
| P-wave Transducers | | | | | |
| 24 kHz Ø50 mm x 95 mm |  | 154 mm | ≈ 77 mm | 154 mm | » Concrete: Very coarse aggregate and large objects (several meters) |
| 54 kHz Ø50 mm x 46 mm |  | 68.5 mm | ≈ 34 mm | 69 mm | » Concrete » Wood » Rock |
| 150 kHz Ø28 mm x 46 mm |  | 24.7 mm | ≈ 12 mm | 25 mm | » Fine grained material » Refractory bricks » Rock (NX cores) |
| 250 kHz Ø28 mm x 46 mm |  | 14.8 mm | ≈ 7 mm | 15 mm | » Fine grained material » Refractory bricks » Rock » Use on small samples |
| 500 kHz Ø57 mm x 32 mm |  | 7.4 mm | ≈ 3 mm | 7 mm | » Fine grained material » Refractory bricks » Rock » Use on small samples |
| 54 kHz Ø50 mm x 100 mm |  | 68.5 mm | ≈ 34 mm | 69 mm | » Concrete: Rough and rounded surfaces (no couplant required) » Wood » Rock (heritage sites) |
| S-wave Transducer | | | | | |
| 250 kHz Ø41 mm x 32 mm |  | 10 mm | ≈ 5 mm | Greater than the thickness of the object. | » Used for determination of elastic modulus » Concrete, wood, rock (small samples only) » Requires special shear wave couplant |

*A pulse velocity of 3700 m/s (longitudinal wave) and 2500 m/s (shear wave) have been used for the computation of the wavelengths.

PUNDIT® PL-200PE

ULTRASONIC PULSE ECHO

Pundit PL-200PE – Groundbreaking Ultrasonic Pulse Echo Testing

The Pulse Echo technology widely extends the application range of the Pundit Touchscreen Unit and offers a variety of special features:

- ✓ **Single side determination of slab thickness**
- ✓ **Detection and localization of voids, pipes, cracks (parallel to surface) and honeycombing**
- ✓ **Advanced echo tracking technology helps identifying the main echo**
- ✓ **Control buttons and optical feedback directly on the probe increase measurement efficiency**
- ✓ **Automatic estimation of the Pulse Velocity**
- ✓ **Easy B-Scan measuring through center marker and rulers directly on the probe**
- ✓ **Dry-contact transducer: no couplant required, suited for measuring on rough surfaces**
- ✓ **Lightweight and ergonomical handling**
- ✓ **Expandable with Pulse Velocity transducers**



Ordering Information Pundit PL-200PE

Part Number: 327 20 001

Consisting of: Pundit Touchscreen, Pundit Pulse Echo Transducer incl. cable, contact tester, power supply, USB cable, calibrated tape, DVD with software, documentation, carrying straps and carrying case

Scan Modes

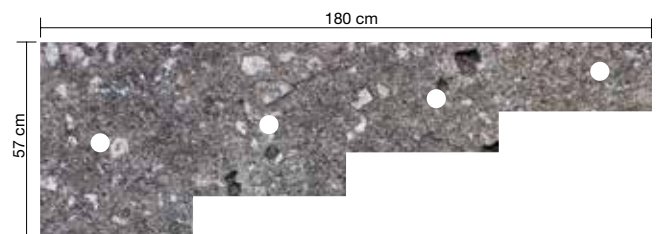
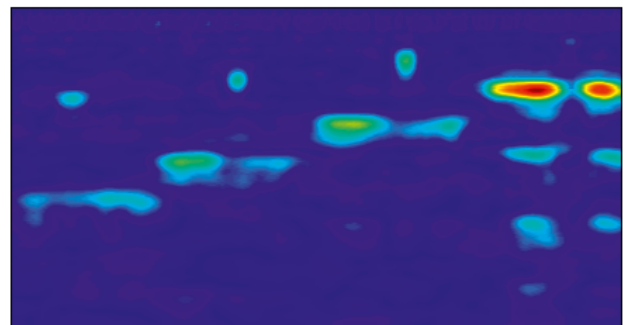
A-Scan

- » A-Scan allows direct analysis of the raw signal.
- » Digital filters for better echo visibility and noise suppression.
- » Automatic readout of slab thickness (Echo tracker).

B-Scan

- » A cross-sectional view perpendicular to the scanning surface is provided. It facilitates the search for pipes, cracks, voids, etc.
- » State-of-the-art image processing for improved image quality.
- » Cursor placement allows a direct readout of the slab thickness and the location of hidden objects or defects.

Example: B-Scan of a concrete object containing steel pipes:



Center marker and rulers directly on the transducer help generating the B-Scan:



PUNDIT® PL-200PE

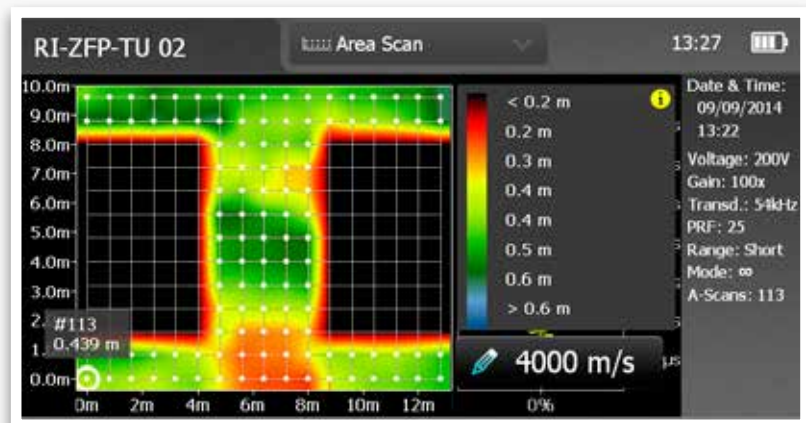
ULTRASONIC PULSE ECHO

Additional Measurement Mode

Area Scan


2D-visualization for uniformity testing of slab thickness on structural elements.

- ✓ User definable colour classification based on thickness measurements
- ✓ Grid pattern fully adjustable e.g. for tunnel lining thickness variations as described in RI-ZFP-TU guideline



Pulse Echo Transducer

The Pulse Echo transducer is a shear wave transducer designed for single-handed and two-handed operation. It is particularly suited to testing where access is limited to a single side.

| Bandwidth and aperture size | | Test Object Limitations | | | | |
|--------------------------------|-------------------------------------------------------------------------------------|-------------------------|--------------------|---------------------------|---------------------------------------------------------|---------------------------|
| | | Wavelength* | Maximum grain size | Minimum lateral dimension | Penetration depth | Minimum object detectable |
| 50 kHz 2x25 cm ² |  | 50 mm | 50 mm | 2x thickness | Typically 500 mm (up to 1000 mm under ideal conditions) | 30 mm air cylinder |

*A pulse velocity of 2500 m/s has been used for the computation of the wavelength.

Regular Firmware Upgrades

continuously updates and improves the instrument software. Benefit from major firmware releases that extend the functionality and increase the value of Pundit instruments to all existing users free of charge during the product lifetime. The instruments can be upgraded via the internet or from local files.



TECHNICAL SERVICES

NDT Concrete Ultrasonic Training Concept

Training modules are strongly focused on a practical approach to routine testing of in-situ concrete quality using the **Pundit range of ultrasonic products**.

Training facilities are located at headquarters in Schwerzenbach (Switzerland), Chicago (USA) and Singapore. All training modules are conducted in English (German, French and Spanish can be organized on demand).

Training fees include all necessary training material and documentation and exclude all travel, accommodation and meal.

Essentials of Non-Destructive Testing (NDT) of Concrete using Ultrasonic Methods

| Description | Prerequisites | Duration | Locations | Course No. |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Characteristics of concrete; overview of NDT methods; ultrasonic pulse velocity principles and methods for assessing compressive strength of concrete, detecting voids and cracks; transducer types; product and practical training (Pundit Lab, Pundit Lab+, Pundit PL-200). | Any technical background or prior experience with NDT products will allow quicker and deeper comprehension of the course material. | 1 day | <ul style="list-style-type: none">Schwerzenbach (Zuerich, Switzerland)Chicago (United States of America)Singapore | 970 00 300 |

Advanced Ultrasonic Tomography Applications

| Description | Prerequisites | Duration | Locations | Course No. |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| NDT ultrasonic methods to evaluate concrete from a single surface; using tomography to detect air filled voids and cracks; locate structural elements, pipes, ducts and honeycombing. Product and practical training (Pundit PL-200PE); detailed review and interpretation of specific tomographic application examples. | Participants are expected to be experienced NDT users, any on-site ultrasonic experience will allow a focused discussion on specific application issues. | 1 day | <ul style="list-style-type: none">Schwerzenbach (Zuerich, Switzerland)Chicago (United States of America)Singapore | 970 00 400 |

Application Support Service



“Ask Malcolm” is an Application Support Service provided by to owners and users of the PL-200PE who have completed the corresponding advanced training module. It is supported by a team of renowned experts who have years of hands-on, on-site NDT inspection expertise.

Prerequisites

Purchase of a PL-200PE;
Completion of the module “Advanced Ultrasonic Tomography Applications” with course no. 970 00 400

Access

website

PUNDIT® PL-200

ULTRASONIC PULSE VELOCITY

PUNDIT® PL-200PE

ULTRASONIC PULSE ECHO

Ordering Information

Units

| PART NO. | DESCRIPTION |
|------------|----------------------------------------|
| 327 10 001 | Pundit PL-200 |
| 327 20 001 | Pundit PL-200PE |
| 327 10 002 | Pundit Touchscreen without transducers |

Supplementary Transducers

| | |
|-------------|--------------------------------------------------------------|
| 325 40 026S | 2 Transducers 24 kHz |
| 325 40 131S | 2 Transducers 54 kHz |
| 325 40 141S | 2 Transducers 150 kHz |
| 325 40 177S | 2 Transducers 250 kHz |
| 325 40 175S | 2 Transducers 500 kHz |
| 325 40 176 | 2 Exponential Transducers 54 kHz, incl. calibration rod |
| 325 40 049 | 2 S-Wave Transducers 250 kHz, incl. couplant |
| 327 40 130 | Pundit Pulse Echo Transducer, incl. cable and contact tester |
| 327 20 002 | Pundit PL-200PE UPV Kit |

Accessories

| | |
|-------------|------------------------------------------|
| 327 01 043 | Carrying strap complete |
| 325 40 150 | Transducer holder complete |
| 327 01 049 | BNC adapter cable for Pundit PL-200 |
| 325 40 021 | Cable with BNC-plug, 1.5 m (5 ft) |
| 325 40 022 | Cable with BNC-plug, 10 m (33 ft) |
| 710 10 031 | Ultrasound couplant, 250 ml |
| 325 40 048 | Shear wave couplant, 100 g |
| 327 01 033 | Battery complete |
| 327 01 053 | Quick charger (external) |
| 710 10 028 | Calibration rod 25 µs for Pundit PL-200 |
| 710 10 029 | Calibration rod 100 µs for Pundit PL-200 |
| 327 01 071S | Calibrated Tape (Set of 5) |

Technical Specification

| | Pundit PL-200 | Pundit PL-200PE |
|-----------------------|----------------------------------------------------------------------------------------------------------------------|-----------------|
| Range | 0.1 – 7930 µs | |
| Resolution | 0.1 µs (< 793 µs), 1 µs (> 793 µs) | |
| Display | 7" colour display 800x480 pixels | |
| Pulse Voltage | UPV | 100 – 450 Vpp |
| | UPE | – 100 – 400 Vpp |
| Bandwidth | 20 – 500 kHz | |
| Receiver Gain | 1x – 10'000x (0 – 80dB) [11 steps] | |
| Memory | Internal 8 GB Flash memory | |
| Regional Settings | Metric and imperial units and multi-language supported | |
| Battery | Lithium Polymer, 3.6 V, 14.0 Ah | |
| Battery Lifetime | > 8h (in standard operating mode) | |
| Operating Temperature | 0°C – 30°C (Charging, running instrument) 0°C – 40°C (Charging, instrument is off) -10°C – 50°C (Non-charging) | |
| Humidity | < 95 % RH, non condensing | |
| IP Classification | IP54 | |

Service and Support

Warranty Information

Each instrument is backed by the standard warranty and extended warranty options.

- » Electronic portion of the instrument: 24 months
- » Mechanical portion of the instrument: 6 months



Grid 02

