Specifications

PIT-X WIRELESS ACCELEROMETER:
Size: 92 mm H X 44 mm dia. (nominal, 53 mm max.)
Weight: 112 g
Temperature Range: 0 to 40° C operating; -20 to 65° C Storage
Nominal sensitivity: 50mV/g
Acceleration range: ±100 g
Shock limit: 30,000 g
Frequency range: 0.7 to 9,000 Hz
Amplitude linearity: <± 1%
Resonant frequency: > 40 KHz
Nominal time constant: > 0.5 s
Data transmission range 3m
Transmission frequency range: 2.4GHz to 2.4835GHz
Output power: 10mW
Internal battery (8 hour duration)
Available in top mount only
Attachment by flat base mount with adhesive

PIT-V AND FV ACCELEROMETERS:
Size: 20 x 20 x 60 mm.
Temperature Range: -50 to 120°C operating.
Circuit: Integral impedance converting electronics.
Nominal sensitivity 50 mV/g.
Acceleration range: ±100g.
Shock limit: 30,000 g.
Frequency range: 0.7 to 9000 Hz.
Amplitude linearity: <± 1%
Resonant frequency: >40 kHz.
Nominal time constant: 0.5 s.
Low noise shielded cable (1500mm).
Available in top or side mount
Attachment by bolt on system (side) or flat base mount (top) with adhesive.
Full waterproofing optional.

PIT HAMMERS:

Tip Diameter	Approximate Weights	
	Non-Instrumented	Instrumented
1 – 1/2" (38.1mm)	1 lb. (500g)	1 lb. (500g)
2" (50.8mm)	3 lbs. (1400g)	3 lbs. (1400g)
3" (76.2mm)	8 lbs. (3600g)	9 lbs. (4100g)

Fitted with replaceable hard plastic tips.
Instrumented hammer is equipped with 5mV/g accelerometer.

All models of the Pile Integrity Tester comply with ASTM D5882 and many other codes and specifications.

PIT-X

Physical
Size: 135 X 104 X 52 mm
Weight: 0.45 Kg
Screen size: 9.4 cm (3.7")

Electronic
Microprocessor: PXA270 @ 520 MHz
Data Storage: Built in 2GB drive
USB port for easy data retrieval
24 bit A/D converter
Analog Signal Frequency response: 31KHz (-3dB)
Sampling Digitizing frequency of > 1MHz (net frequency after DSP > 32KHz)
Sampling Frequency accuracy within 0.09%
Wireless range 3m
Sampling speed of 64KHzfor nominal pile testing (up to 128 KHz for shorter piles or floor slabs)

Functional
One channel of acceleration data acquisition, one integrator of acceleration to velocity.
Accepts data from wireless PIT-X accelerometer.
Capability of measuring and reproducing signals of duration between 8 and 30 ms.

Other
Soft carrying case.

PIT-V and PIT-FV

Physical
Size: 75 X 170 X 235 mm.
Weight: 2.2 kg.
Screen size 18.3 cm (7.2")

Electronic
Microprocessor SA 1110 Strong Arm operating at 200 MHz.
Memory card data storage.
24-bit A/D converter with 1 or 2 channels.
Analog signal frequency response 22 KHz (-3dB).
Sample digitizing frequency of > 1MHz.
Sampling frequency accuracy within 0.01%.
Trigger level: 0.3 volts

Functional
Signal conditioning. When a force measurement is also acquired, the signal conditioning for force and velocity have similar frequency response curves.
One or two channels of acceleration data acquisition, and one integrator of acceleration to velocity.
Capability of measuring and reproducing signals of duration between 2 and 30 ms.

Other
Carry-on transit case.

Common Features

- *All models of PIT are designed to be operated for a full day on internal batteries and have sunlight readable full VGA displays.*
- *All models allow identification of each pile tested, and include date and time stamps.*
- *All PIT models have data analysis features such as variable signal amplification and averaging over a variable number of blows.*

For complete up to date specifications visit www.pile.com/specifications

Pile Dynamics Inc

vertreten durch
GSP mbH

Steubenstraße 46 D-68163 Mannheim
Tel: +49 621 33 13 61 Fax +49 621 34 35 8
info@gsp-mannheim.de www.gsp-mannheim.de

Pile Dynamics, Inc.

Pile Integrity Tester

Pile Integrity Tester: PIT-X, PIT-FV and PIT-V

The Pile Integrity Tester (PIT) performs Low Strain Integrity Testing, also called Sonic Echo or Pulse Echo Testing.

The PIT may be used for augered cast-in-place (CFA) piles, drilled shafts, driven concrete piles, concrete filled pipes and timber piles. It detects potentially dangerous defects such as major cracks, necking, soil inclusions or voids and, in some situations, can determine unknown lengths of piles that support existing bridges or towers.

PIT-X: The latest model of the Pile Integrity Tester is also the smallest and lightest. It is the only wireless model of PIT. It is available with one channel of data acquisition (velocity), obtaining measurements from a wireless accelerometer placed on top of the foundation.

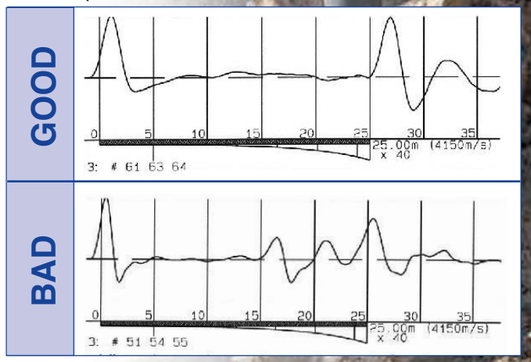
PIT-V, which features a larger screen, also reads velocity data from a single (traditional, or cabled) accelerometer.

PIT-V and PIT-X have one channel input of data acquisition, used to record the acceleration measured on the pile. Data is analyzed in the time domain, which is sufficient for most integrity tests.

Testing with the PIT consists of attaching an accelerometer to the top or side of the foundation and hitting the foundation with a hand held hammer. The impact of the hammer induces a stress wave that travels down the pile and reflects back up. This causes a small but measurable motion of the top of the pile. The accelerometer measures this motion. If a defect is present along the shaft, its size and location can be estimated by analyzing the propagation and reflection of the stress wave. It is also possible to estimate the depth of the pile toe. When the hammer is instrumented (equipped with its own accelerometer), the force it applies to the pile is also measured; this second measurements permits more sophisticated analysis. PIT data is evaluated in the field or transferred to a personal computer for further analysis by the PIT-W software.

PIT-FV has two data input channels. The first input is the acceleration measured on the pile. The second input may be from a second accelerometer or from an instrumented hammer. If the second input is from an instrumented hammer, then a Transient Response (Frequency Domain) analysis can be performed to determine the relative stiffness of the shaft. A comparison of various piles reveals the shaft with the lowest stiffness – possibly a defective one. An instrumented hammer also permits comparing the force (hammer input) and velocity pulses, which may help detect defects in the upper portion of the shaft.

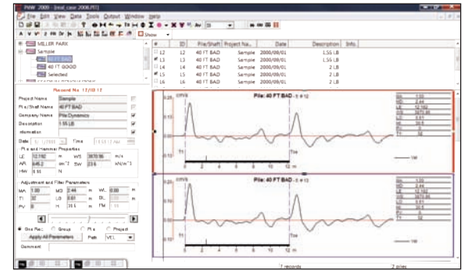
If the second input is another acceleration, it is possible to determine the speed with which the stress wave induced by the hammer travels down the shaft. This is useful when the pile tested is an integral part of an existing structure (side mount accelerometers and side mount impact wedges make testing these piles feasible). A second acceleration input also helps in unknown depth determination, and can be used to eliminate Rayleigh (surface) waves from the measurements (useful for larger shafts).



The output of PIT is a graph of the velocity signal versus pile length as shown to the right. Piles with flawless shafts show a reflection from the pile toe as in the augered cast-in-place pile example on right (top). Defective piles show early reflections from the damage location as in the bottom portion of the figure at right. As a rule of thumb, toe reflections should be observed with embedments less than 30 diameters.

Data Processing Software

PIT-W STANDARD VERSION

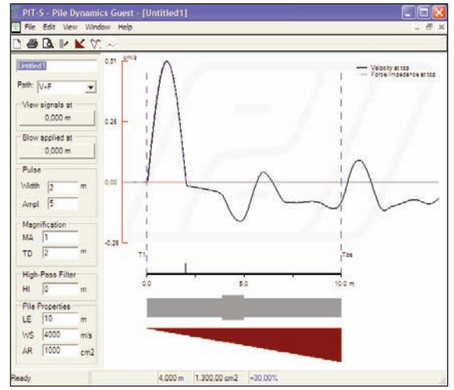


A license of PIT-W Standard Version is supplied with all models of Pile Integrity Testers. The software analyzes records in the time domain and outputs user customized tables and reports. The analysis in the time domain helps evaluate the depth of a potential defect. With PIT-W Standard Version results can be filtered, magnified with an exponential amplification as a function of time, and plotted.

PIT-W PROFESSIONAL VERSION

PIT-W Professional Version has all the features of the Standard Version plus advanced tools for data interpretation: Frequency Domain Analysis (complete frequency domain analysis requires both force and velocity data, from PIT-FV), Pile Profile Analysis, Two Velocity Analysis (requires 2 acceleration inputs, from PIT-FV), Beta and Surface Wave Analysis and Multiple Column Plot.

PIT-S



PIT-S simulates a PIT test. It allows the user to enter a pile shape, realistic soil layer properties and characteristics of a hammer impact. It then displays the signals that would result from a test performed in those circumstances with either one (PIT-X and PIT-V) or two (PIT-FV) channels of data acquisition. Curves simulated by PIT-S may be overlaid over curves actually measured in the field for a simple signal matching process that helps investigate the cause of observed reflections. A demonstration version of the PIT-S software comes with all models of the Pile Integrity Tester.

Fast Fourier Transform Feature

All Pile Integrity Tester models are offered with a FFT feature. FFT stands for Fast Fourier Transform, a computational algorithm that calculates the various frequency components of a recorded signal.

The analysis of PIT signals in the frequency domain aids in detecting anomalies and estimating their locations. The dominant frequencies of a signal may reveal the length of the foundation or the distance to a major defect.

FFT screen on PIT-X.

With the addition of the FFT feature to the PIT itself the frequency response is available immediately, on site. The FFT feature includes peak detection with automatic calculation of associated distances and length values. The hardwired PIT FFT function is particularly helpful for determining the length of relatively short foundation elements (up to 1.5 m), for which FFT reveals a length related dominant frequency. The complete frequency analysis of PIT signals is performed with the PIT-W Professional software (in a computer).