Strain Transducers and Accelerometers manufactured by Pile Dynamics are reliable, convenient to install and remove, and highly durable. Available in wireless or traditional (cabled) versions.

**Accuracy:** PDI sensors collect axially accurate signals at high microstrain (strain transducers) and “g” (accelerometers) levels.

**Traceability:** PDI sensors are traceable to National Institute of Standards and Technology (NIST) specifications. Calibration sheets are furnished with each sensor. Pile Dynamics recommends that sensors be recalibrated at least every two years, in accordance with ASTM D-4945.

**Versatility:** In addition to collecting data for high strain dynamic foundation testing with the Pile Driving Analyzer® (PDA) system, accelerometers are also used for SPT hammer energy calibration with either the PDA or the SPT Analyzer. SPT hammer calibration also requires a specially instrumented SPT rod (strain gages glued to the rod are used in lieu of strain transducers for this application). PDI strain transducers are compatible with other applications requiring strain measurements, such as static load monitoring and structural monitoring of bridges and other structures.

All accelerometers and strain transducers include Smart Sensor Technology and send data to a PDA up to 100 m away. The PDA recognizes the sensors, knows to which channel of data acquisition each is connected, and reads their number, calibration, and date of last calibration.

**Smart**

When used for Dynamic Foundation Testing or Pile Driving Monitoring, accelerometers and strain transducers are bolted to the foundation, usually about 2 to 3 diameters below the top. Strain transducers are attached symmetrically about the neutral axis of the foundation to account for bending effects, and accelerometers are attached near the strain transducers.

Typically two or 4 pairs of sensors are used for routine foundation testing. Attachment procedure varies depending on the type of foundation, but is generally quick:

- **Steel Pipe Piles:** Drill and tap holes; magnetic drilling guide available
- **Steel H Piles:** Drill clearance holes and install bolts / nuts
- **Timber Piles:** Drill holes with lag bolts
- **Concrete Piles and Shafts:** drill holes and embed anchors; metal drilling guide available
- **Drilled shafts, augered cast in place, spiral welded piles and other non uniform foundations:** 4 strain transducers are recommended to assess bending stresses along 2 axes.

**Installation**

Drilling guides for steel (upper left) and concrete (upper right) piles make it simple to drill holes for the 6 mm (1/4-20”) bolts at the correct spacing.

**Quality Assurance for Deep Foundations**
Specifications

Piezoelectric (PE) Accelerometer
Mounting: Custom aluminum block (25 x 25 x 25 mm)
Circuit: Integral impedance converting electronics
Cable: Shielded, standard length 900 mm (traditional) or 450 mm (smart)
Sensitivity: Nominally 1.0 mV/g with 10 V.D.C. bias voltage input
Range: 5,000 g (Limit 10,000 g)
Frequency Range: 0.25 to 7000 Hz (resonant freq: > 40 kHz)
Temperature Range: -50° to 120°C operating
Time Constant: At least 1 second
Attachment Method: Bolts to pile
Options: Full waterproofing, extra cable length

Wireless Transmitter
Two Channels of data acquisition
Transmits data from any of these sensor combinations:
- two strain transducers,
- one strain transducer and one piezoresistive (PR) accelerometer
- one strain transducer and one piezoelectric (PE) accelerometer
- two PR accelerometers
- one PR accelerometer and one PE accelerometer
2 channel signal conditioning can be used for strain transducer, PR accelerometer, or PE accelerometer
24 bit A/D converter with 2 channels at up to 20 KHz sample rate per channel
1K, 2K, and 4K data record sizes available – user selectable
Data Transmission: via a standard radio protocol
Radio Transmission Range: up to 100 m
Power: Low power processor and built-in 3.7 V battery for up to 8.5 hours run time during constant data acquisition. Optional extended use battery for up to 24 hours run time.
Size: 175 x 90 x 20.7 mm
Weight: 0.63 Kg
Temperature Range: 0° to 40°C operating, -20° to 65°C storage.

Piezoresistive (PR) Accelerometer (Model K)
Mounting: Custom aluminum block (45 x 25 x 30 mm)
Circuit: Full bridge
Cable: Shielded, standard length 900 mm (traditional) or 450 mm (wireless)
Sensitivity: Nominally 0.07 mV/g with 6.4 V.D.C. input
Range: 20,000 g (Limit 30,000 g)
Frequency Range: DC to 4.5 kHz
Temperature Range: -12° to 55°C operating
Attachment Method: Bolts to pile
Options: Extra cable length

Strain Transducer
Effective Gage Length: 76 mm standard
Size: 126 x 35 x 11 mm
Material: Aluminum (Steel option for structural or static testing)
Circuit: Full Wheatstone bridge
Cable: Shielded, standard length 900 mm (traditional) or 450 mm (wireless)
Sensitivity: Nominally 380 µ/mV/V
Strain Range: Nominally 3000 µε
Shock Range: Nominally 5000 g
Natural frequency when attached to foundation: greater than 2000 Hz
Temperature Range: -50° to 120°C operating
Attachment Method: Bolts to pile.
( Optional C-clamps or mounting tabs and adhesive for structural testing)
Options: Full waterproofing, extra cable length, and as embedded transducer with 3 ft (91.4 cm) long #4 (12.7 mm diameter) steel rebar or 4 ft (122 cm) long #5 (15.9 mm diameter) steel rebar (sister bars).

Sensor Protectors:
For driven pile testing, sensors may be installed with the pile on the ground. Sensors can then be protected with Pile Dynamics’ Sensor Protectors (as shown on picture to the right) prior to lifting.