

# Pile Driving Monitor (PDM)



In many countries, the current practice for accepting piles requires the measurement of set and sometimes Temporary Compression (TC) on the pile during installation. Working in close proximity to piling hammers can present significant safety risks to personnel, such as high noise, falling debris from hammers, lead or spalling concrete from the pile head and more. The Pile Driving Monitor (PDM) helps eliminate those risks while fulfilling the acceptance measurement needs. The combined speed, accuracy and improved safety of the PDM allows for all foundation elements to be tested during the installation process.

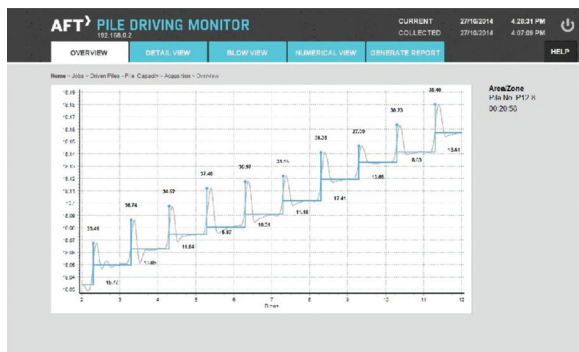
The PDM uses optically safe infrared lasers to track a disposable reflective sticker adhered directly to the pile. Because the maximum pile movement occurs before the ground vibrations reach the PDM, and the final set measurement is taken after the vibrations have passed, the set and temporary compression measurements are accurate to  $\pm 0.1$  mm or better at a distance of 10 m from the pile. The PDM can be mounted on a tripod or placed on the ground 5 m to 15 m from the pile.



## The PDM Allows:

- Recording of pile set and temporary compression while protecting the health and safety of site personnel
- Hammer monitoring
- Monitoring of marine piles from a fixed platform

The use of a PDM in combination with the Pile Driving Analyzer® (PDA) on driven piling projects represents a second wave of monitoring, creating an integrated approach to providing an unprecedented level of quality assurance to every pile. It also provides a pathway to verification and sign-off of the whole foundation system.



PDI offers training in the use of the PDM.

## Software

The PDM software is preloaded onto a Microsoft Surface Pro 3 tablet, provided with every PDM. Communication between the Tablet and PDM is wireless to maximize flexibility and minimize trip hazards on site. It also provides the opportunity for the tablet to be cabin-mounted, as well as an option for connection via USB cable.

## Quality Assurance for Deep Foundations

## Specifications

**Weight (including battery):** 4 kg

**Dimensions (w x h x d):** 172 x 200 x 342 mm

**Operating Temperature:** -10° to +40°C

**IP Classification:** IP65

### Optics:

**Transmitters:** 4 pcs IR-LED

**Measuring FOV (Field of View):** 50 mrad  
(vertical, 50 cm / 10 m)

**Pointers:** 2 pcs Class 2 visible laser, 635 m

**Reflector(s):** 3M Diamond Grade tape, optimally 6 to 10 m from PDM

**Extended Range (<6m - >10m):** Tape reduced or increased in width accordingly

**Sampling Rate:** 100-400 Hz

### Accelerometer, Tilt & Rotate

**Static Measurement Range:**  $\pm 50^\circ$

### Supply Power:

**Battery (removable):** Ultralife UBBL25,  
Li-ion 10.8V, 4.8Ah

**Charger:** Mascot 2240LI/3CELL

### Data Interfaces:

**WLAN:** Lantronix xPico Wi-Fi

**USB:** LTW, B-type female connector (IP68)

**USB Cable Included:** 5 m

### Current Consumption (12 V, typ.):

**PDM Run Time:** up to 24 hours

## Operational Characteristics

**Offset Distance Range :** 5 m to 15 m maximum from pile

**Recommended Range:** 6 m - 10 m from pile

### Recommended Maximum Rotational Deviations:

**From Horizontal Plane:** 1 V : 10 H

**From Vertical Plane:** 1 H : 10 V

**Recommended Accuracy in Offset:** 10 mm or better

**Notional Displacement Accuracy:**  $\pm 0.1$  mm within recommended range

**Notional Velocity Accuracy:**  $\pm 0.1$ m/s within recommended range and at 1 kHz conditioning frequency

**Recommended Mounting:** Solid placement on sand bag on ground or on survey tripod

**Sampling Rate for Pile Monitoring:** 4000 H  $\pm 0.2\%$

### Hardware:

**Secure Connection:** Standard WPA2,  
password protected

**Anti-Amendment Report:** Key values of the site report (input identification and output results) are encrypted into a QR code. Through current validation, utility authorities can tell whether or not a report is modified

## Warnings & Classifications

**Class 2 Laser-Device:** Classification IEC 60825-1:2007  
Class 2: "visible-light lasers (400 – 700 nm) limited to maximum 1 MW continuous wave"

**Warning:** using the device in any other way than is described can expose the user to dangerous invisible optical radiation.



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