

Applications

The standard MPBX (Multi-point borehole extensometer) is a rod-type extensometer that monitors changes in distance between downhole anchors and a reference head.

Typical applications include:

- Monitoring settlement in soil above tunneling and other mining activity.
- Monitoring settlement due to loading of foundation soils.
- Monitoring deformation of retaining walls, cut slopes, and tunnel walls

Standard MPBX Components

Components of the standard MPBX include anchors, fiberglass rods inside friction breaking tubing, a reference head with displacement sensors. Common options include a waterproof enclosure for the reference head and a wireless logger.

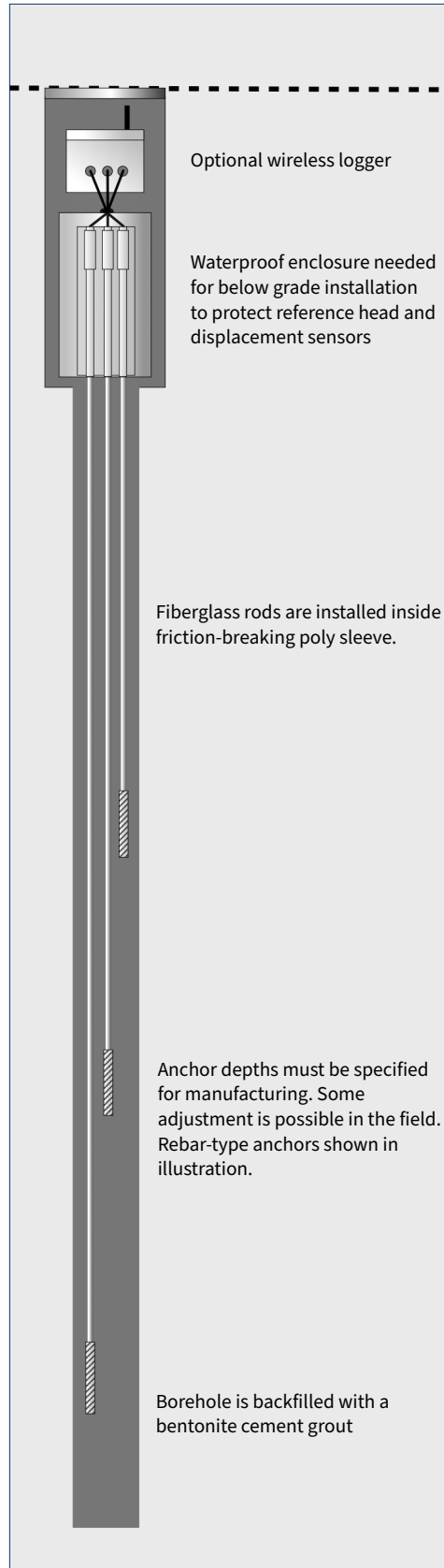
Anchors and rods are installed at specified depths in the borehole. Rods run upwards from the anchors to the reference head at the top of the borehole.

Displacement sensors inside the reference head monitor the rods, which follow the upward or downward movement of the anchors.

Displacement sensors are powered by an external logger. The logger obtains sensor readings at scheduled intervals. Wireless loggers also transmit the measurements to an internet gateway.

The gateway receives the transmissions and forwards them to a GeoCloud server on the internet. The GeoCloud server processes the measurements, checks them against alarm thresholds, and then stores them in a database.

Users access the measurements via a secure GeoCloud project website, using their desktop or mobile web browsers. The website presents data in trend plots, site-wide status views, and PDF reports.



Specifications

Reference Head: Standard configuration holds 4 displacement sensors. Other configurations are available.

Displacement Sensors: Vibrating wire or linear potentiometer.

Sensor Range: 6 inch. Other ranges are available.

Sensor Resolution: 0.01 % FS.

Sensor Accuracy: ± 0.20 % FS.

Rods: 0.1875-inch OD fiberglass installed inside friction-breaking sleeve.

Sleeve: Continuous poly tubing.

Anchors: Rebar type, 12-inch length, attached to rod and sleeve at factory. Geotextile packer anchors are also available.

Wireless Logger Specifications

Sensor Compatibility: 4-20 mA linear potentiometers or vibrating wire sensors.

Measurement range: 6 inch typical. Other ranges are available.

Accuracy (0 to +50°C): ± 0.05 % FS.

Reading Intervals: 30 second to 24 hours.

Memory: 200,000 readings for single sensor, 72,000 readings each for multiple sensors.

Built-in Barometer: Range 300-1100 hPa, Resolution 0.18 Pa, Accuracy ± 0.12 hPa.

Built-in Temperature Sensor: -40°C to +80°C range, 0.01°C resolution, ± 1.8 °C accuracy.

Battery: 3.6V C-type Saft LSH 14. User changeable. Battery life 11 to 35 months.

Operating Temp: -40°C to +80°C.

Dust & Water: IP67 or IP68, depending on logger.

Wireless Protocol: Typically LoRaWan. Requires internet gateway.

Typical Transmission Range

Line of sight: 9 miles (15 km).

City street: 2.5 miles (4 km).

Manhole in city street: 1.2 miles (2 km).

Tunnel: 2.5 miles (4 km).