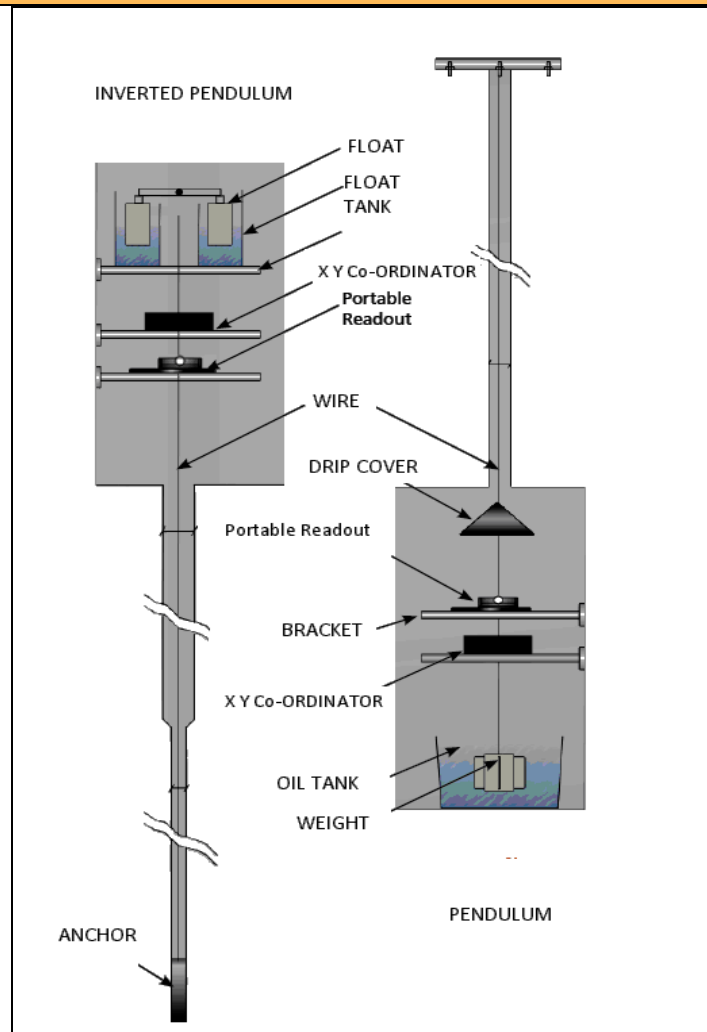




## PENDULAM/TELEPUNDULAM



The Pendulum Systems are primary used to provide reliable, accurate long term monitoring of displacements in dams.

They can also be used as a primary reference for surveying and long term monitoring of tall buildings.

Typically in dam monitoring Pendulum are installed in shafts extending vertically from the crest of the dam to a monitoring gallery located close to the dam foundation.

A well designed installation should enable horizontal movement of the dam to be monitored, in both upstream and downstream left/right bank directions.

Pendulum systems require little maintenance and can provide displacement data for periods in years.

The Pendulum provides measurements of the rotation or tilting of a structure (such as a dam or tower). A pendulum wire 'hanger' is attached near the top of the structure and reference frames are installed at lower levels within the structure so that any movements are observed as relative displacements between the reference frames and the pendulum wire.

### PENDULAM

Simple and reliable systems used to monitor internal lateral deformations of concrete dams, dam foundations and abutments, tall industrial buildings and bridge piers.

The direct pendulum (plumb line) consists of a stainless steel wire attached to a fixed point at the top of structure, a weight and a tank of damping fluid to damp movements. Displacements relative to the wire are measured by optical reading stations and telependulum.

The inverted pendulum uses the same readout units but the wire is anchored in the foundation.



**FEATURES**

Simple, reliable and accurate for long-term use, Available as both direct & inverted systems Inverted pendulum measures absolute deformation of structure and can be used to monitor movement during construction; also as reference for geodetic surveying Telependulum for remote monitoring and datalogging

Inverted Pendulum is installed into bedrock to measure movement of the dam relative to the foundation material. An Inverted Pendulum consists of a stainless steel wire grouted into bedrock at the bottom of a borehole with the upper end of the wire attached to an annular cylinder floating inside a circular tank. When the float is in its rest position the wire is truly vertical. The wire therefore forms a datum from which any horizontal movements can be measured.

<b>INVERTED PENDULUM</b> Weight Dimensions	<b>PENDULUM</b>
Material	Anchor 4.0 kg 800L x 50W x 50Dmm Stainless Steel
Float Unit 11.0kg 610Ø x 400mm	Weight 32.0kg 250Ø x 252H Steel
Float Tank 16.0 kg 790Ø x 540mm	Oil Tank 3.0kg 700Ø x 520H PVC
Support Frame Anchor 15.0kg 1040 x 550 x 250mm Stainless Steel	WIRE
Anchor 8.0kg 600 x 50mmØ Steel	1.6kg/100m 1.6mmØ 316 Stainless Steel

**READING TABLE & BRACKETS**

Table 7.5kg 450 x 450 x 6mm Stainless Steel  
 Brackets 4.0kg (Pair) 750 x 135 x 40mm Stainless Steel  
 The Portable Measurement Microscope comprises of a telescope with fine adjustment for viewing the pendulum wire, mounted on a vernier scaled slide with adjustments for focus and measurement.

<b>SPECIFICATION</b>	<b>XY CO-ORDINATOR</b>
Range X=±75mm Y=±75mm	Range X= ±25mm Y= ±25mm
Resolution 0.1mm	Resolution 0.01mm
Repeatability1 ±0.1mm	Repeatability ±0.1mm
Accuracy ±0.1mm	Accuracy ±0.1mm
Weight 4kg	



### **AUTOMATIC PENDULUM READOUT**

To determine the position of a pendulum wire within the central reading aperture. The automatic Pendulum readout detects the movement in X, Y with out any contact made with the wire, the measurement being completely contactless which result in accuracy. The reading arrays are corrected automatically for temperature and the entire readout can be replaced without the need to move the pendulum wire. A permanent digital display on the readout displays X & Y position in millimeters, updated 2 times per second. The readout also has an RS485 and an analogue output meaning it can be incorporated into almost any data acquisition system.

### **TELEPENDULAM SYSTEM**

For Monitoring and measuring lateral movements in structure including:

Relative displacement between the base and top of a dam or between the dam and foundation structural and foundation structures.

Horizontal displacement of bridges, rock and building foundations.

#### **FEATURE**

Precise optoelectronic detection system for monitoring x, y and z axis

Available as both direct & inverted system

Local microprocessor for real-time recording

Weatherproof housing

On-board data protection system

Ability to connect to several types of dataloggers

### **SPECIFICATIONS**

Data Storage	370 events
Local software	EPROM
Communication port	RS232C,RS485
Modem port	2400/9600bps
Range	50X50X25mm.
Power	9 Va
Voltage	117 VAC

### **SPECIFICATIONS**

#### **AVAILABLE ITEM**

Direct pendulum c/w tensioning weight & tank

Inverted pendulum

Stainless steel wire for pendulums

Portable co-ordinator

RxTx pendulum