

Stainless Steel Strainmeter

91707610

Copyright ©2004 Slope Indicator Company. All Rights Reserved.

This equipment should be installed, maintained, and operated by technically qualified personnel. Any errors or omissions in data, or the interpretation of data, are not the responsibility of Slope Indicator Company. The information herein is subject to change without notification.

This document contains information that is proprietary to Slope Indicator company and is subject to return upon request. It is transmitted for the sole purpose of aiding the transaction of business between Slope Indicator Company and the recipient. All information, data, designs, and drawings contained herein are proprietary to and the property of Slope Indicator Company, and may not be reproduced or copied in any form, by photocopy or any other means, including disclosure to outside parties, directly or indirectly, without permission in writing from Slope Indicator Company.

SLOPE INDICATOR

12123 Harbour Reach Drive
Mukilteo, Washington, USA, 98275
Tel: 425-493-6200 Fax: 425-493-6250
E-mail: solutions@slope.com
Website: www.slopeindicator.com

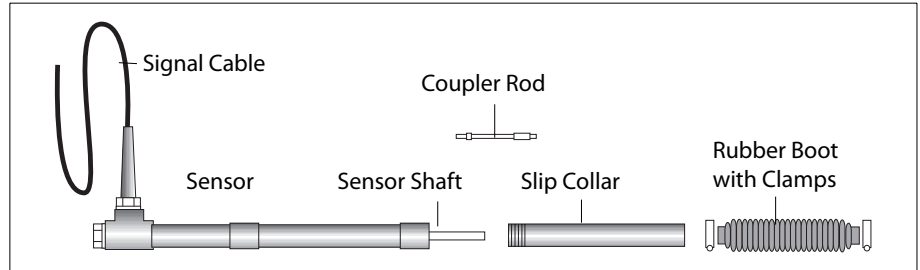
Contents

Assembly	1
Taking Readings.....	5
Data Reduction.....	6
Acceptance Tests.....	7

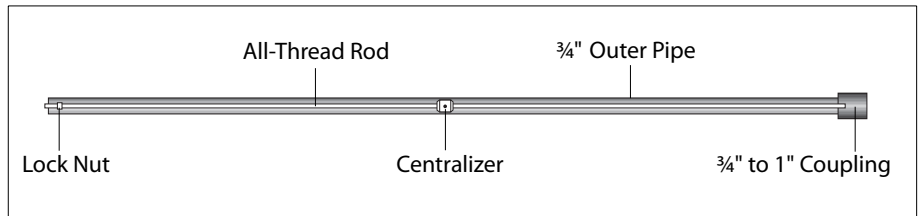
Assembly

Components The basic components of the strainmeter are illustrated below.

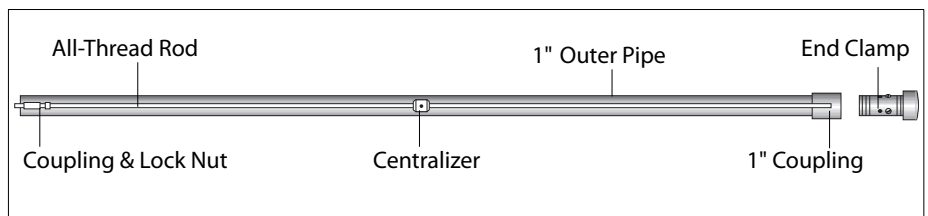
Sensor Sensor components include the sensor, signal cable, a coupler rod, a slip collar, and a rubber boot.



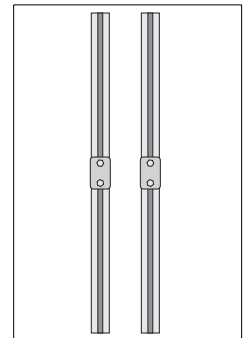
Gauge Rod The gauge rod includes all-thread rod with lock nut and centralizer, outer pipe, and coupling. Rod is longer than shown in drawing.



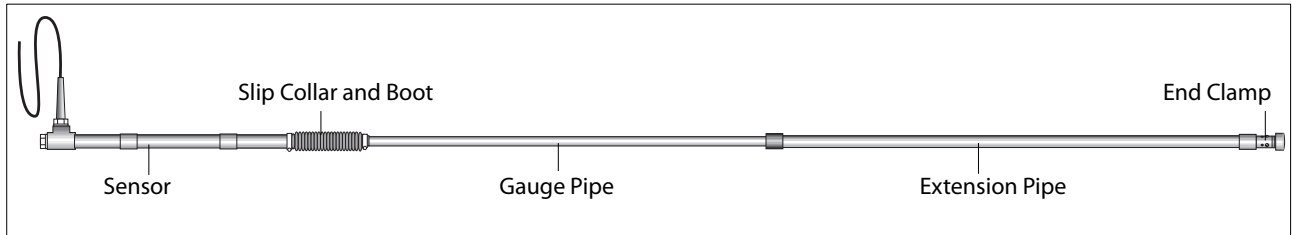
Extension Rod and End Clamp Extension rod includes all thread rod with coupling and lock nut, centralizer, and outer pipe. End clamp includes clamp, and end cap. Rod is longer than shown in drawing.



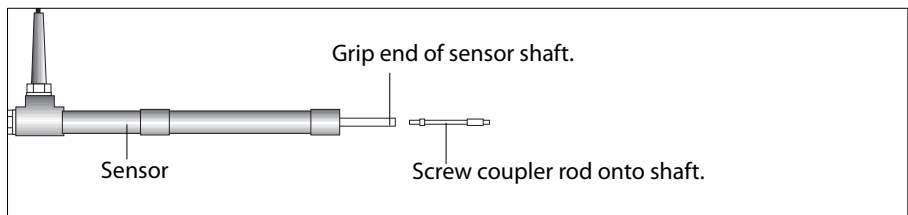
Anchors Anchors clamp onto the outer pipe at each end of the strainmeter. Anchors may be replaced by plates, as required. Anchors are typically clamped to the outer pipe at each end of the strain gauge. Since many variations are possible, this manual will leave attachment of anchors to site engineers.



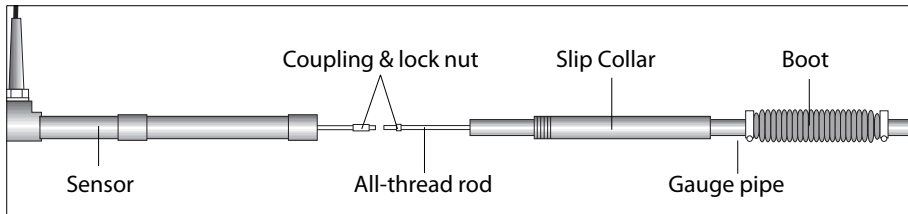
Overview The strainmeter is typically installed in trenches. Assembly can begin at either end of the strainmeter. The drawing below shows the finished assembly without anchors.



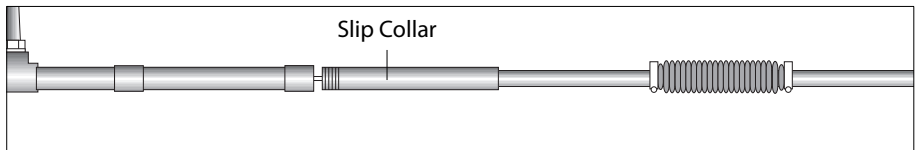
- Prepare Sensor**
1. Screw coupler rod onto sensor shaft. Tighten lock nut.
 2. Push sensor shaft into housing.



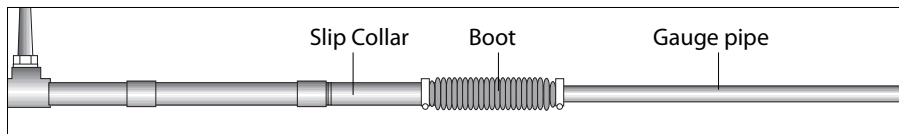
- Add Gauge Rod and Pipe.**
1. Slide boot, clamps and slip collar onto gauge pipe. Orient threaded end of slip collar toward sensor. Join coupler rod and gauge rod. Tighten lock nut. Push rod toward sensor until it stops.



2. Screw slip collar onto sensor.

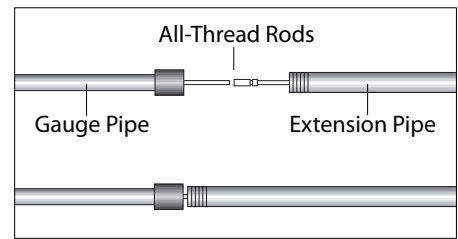


3. Push gauge pipe towards sensor until it stops. Position boot to protect slip joint.



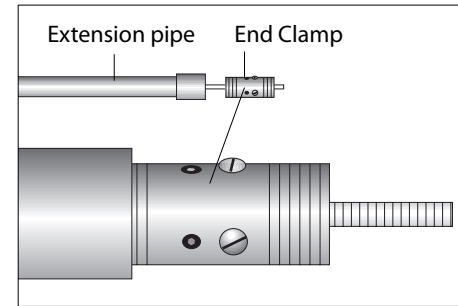
Add Extension Rod

1. Join all-thread rods. Tighten lock nut.
2. Screw extension pipe onto gauge pipe.



Add End-Clamp

1. Slip end-clamp onto all-thread rod. Rod should move freely within end-clamp.
2. Screw clamp into extension pipe, as shown in the drawing.

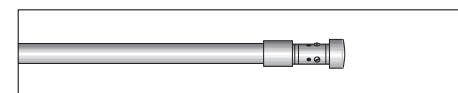
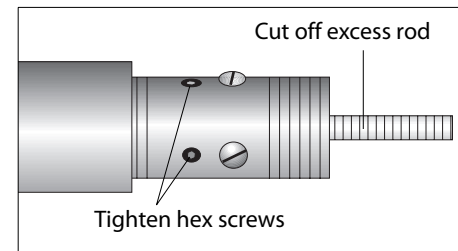


Adjust Range

The strainmeter can be adjusted so that most of its range is available to monitor either extension or compression.

To Monitor Extension

1. Push outer pipe toward sensor until it stops. Then push rod toward sensor until it stops. Strainmeter is now set to measure extension.
2. Connect a readout to check that reading is close to zero. To allow some range for compression, pull rod away from sensor while watching readout. Readout displays percent full scale.
3. Tighten hex screws with 3/32" Allen wrench. Cut off excess rod, and screw on end cap.



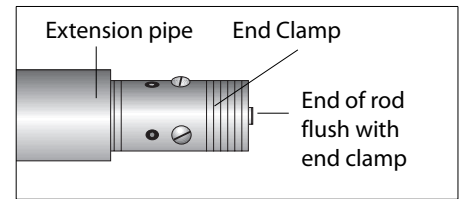
To Monitor Compression

1. Push rod and outer pipe toward sensor as in step 1 above.
2. Temporarily tighten hex screws with Allen wrench.
3. Pull end-clamp (and rod and pipe) away from sensor while watching readout. Stop when readout reaches 100%. To allow some range for compression, loosen hex screws, and push rod toward sensor. Watch readout for appropriate percentage.
4. Tighten hex screws with Allen wrench. Cut off excess rod, and screw on end cap.

Assembly in Reverse Order

In some cases, it may be necessary to assemble the strainmeter starting at the end opposite the sensor. Here are some tips.

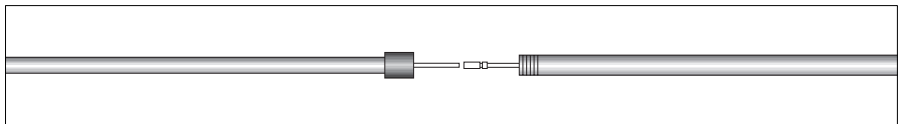
1. Slip end-clamp onto rod and screw into extension pipe. Push end of the rod flush with end-clamp. Tighten hex screws and screw on end cap.



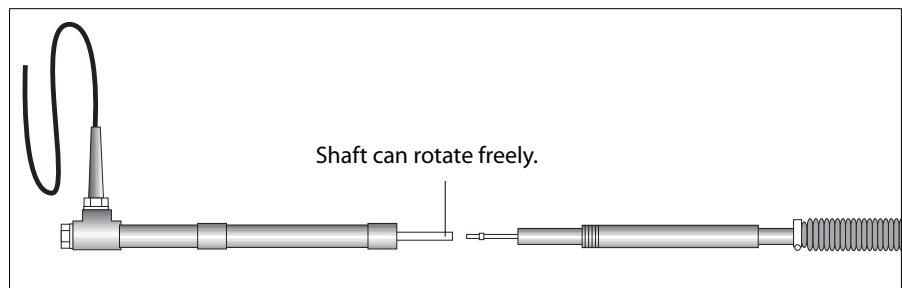
2. Prepare gauge rod by adding coupler rod. This must be done before rod is attached to extension rod.



3. Add gauge rod and pipe to the extension rod and pipe.



4. Slide the boot and slip collar onto the gauge pipe. Pull out the sensor shaft and screw it into the coupler rod. Tighten lock nut.





5. Screw the slip collar onto the sensor.
6. Connect a readout and move the sensor to verify that it can provide the full range of readings. If the lower end of the sensor reading does not go to zero, shorten the coupling rod.

Taking Readings

DataMate MP Readout

These instructions tell how to read the strainmeter sensor using the DataMate MP's manual mode. Please refer to the DataMate MP manual for details of program mode.

1. Connect signal cable as shown in the table below.
2. Switch on. Press  (Manual Mode).
3. Scroll through the list to find "Extensometer RO."

Press  to excite the sensor and display a reading in %FS.

Connecting to Signal Cable

The table below shows how to connect signal cable from the strainmeter to the Bare Wire Adaptor or Universal Terminal Box. Do not use wiring shown in the DataMate MP manual.

Function	Lead Color	BWA
Signal	Blue	1
Excite+	Red	5
Remote Sense+	Green	6
Excite -	Yellow	7
Remote Sense -	Orange	8

Data Reduction

Potentiometer Readings

Each potentiometer has its own serial number and calibration sheet with unique values for sensitivity and zero offset.

1. Find the sensitivity and zero offset values on the calibration sheet.
2. Apply the values as shown below. Note the engineering unit that the coefficients produce (either inches or mm). The resulting reading is the position of the sensor shaft. A larger value indicates extension of the shaft.

$$\text{Reading}_{\text{Engineering Units}} = \frac{\text{Reading} - \text{Zero Offset}}{\text{Sensitivity}}$$

where Reading is the sensor reading in % Full Scale

Acceptance Tests

Introduction	The factory performs the tests below before sensors are shipped.
Isolation Test	<ol style="list-style-type: none">1. Set multimeter to highest range.2. Measure isolation of shield wire or body from conductors. Connect to shield wire or body, and then connect to each wire in turn.3. Isolation should be greater than 20 Mega ohms.
Sensor Wiring with Shaft Collapsed	<ol style="list-style-type: none">1. Set multimeter to 10 k ohm range.2. Measure across red and blue wires. Reading should be approximately 10 k ohms (+/- 10%).3. Measure across yellow and blue wires. Reading should be approximately 0 ohms.
Sensor Wiring, with Shaft Extended	<ol style="list-style-type: none">1. Set multimeter to 10 k ohm range.2. Measure across yellow and blue wires. Reading should be approximately 10 k ohms (+/- 10%).3. Measure across red and blue wires. Reading should be approximately 0 ohm.
Sensor Function	<ol style="list-style-type: none">1. Set multimeter to 10 k ohm range.2. Push shaft all the way in.3. Measure across yellow and blue wires. Extend shaft slowly. Reading should increase steadily from 0 ohms to approximately 10 k ohms when fully extended.
Excitation Lead Wiring	<ol style="list-style-type: none">1. Set multimeter to lowest range. Test values will include the resistance of the 22 gauge wire, which is 5.27 ohms per 100 meters or 1.612 ohms per 100 feet (x 2 for a complete loop).2. Measure across red and green wire. Reading should be near 0 ohm.3. Measure across yellow and orange wires. Reading should be near 0 ohm.