

Rebar Strain Meters ("Sister Bars")

Applications

The Model 4911 and 4911A are commonly used for measuring strains in...

- Concrete piles and caissons
- Slurry walls
- Cast-in-place concrete piles
- All concrete structures
- Concrete foundation slabs and footings
- Osterberg pile tests



• Closeup of Model 4911 shown as installed in concrete pile reinforcing cage.



• Model 4911A Rebar Strain Meter (front) and the Model 4911 "Sister Bar" (rear).

Operating Principle

The Model 4911 "Sister Bars" and Model 4911A Rebar Strain Meters are designed to be embedded in concrete for the purpose of measuring concrete strains due to imposed loads. The Model 4911 "Sister Bar" is installed by tying it alongside an existing length of rebar in the rebar cage, while the Model 4911A Rebar Strain Meter is designed to be welded into, and become an integral part of, the existing rebar cage.

The rebar extensions on either side of the central strain gaged area are long enough to ensure perfect contact with the surrounding concrete so that the measured strains inside the steel are equal to the strains in the surrounding concrete.

In use, sister bars and rebar strain meters are usually installed in pairs on either side of the neutral axis of the structural member being investigated. This is done so that bending moments can be separated from axial loads.

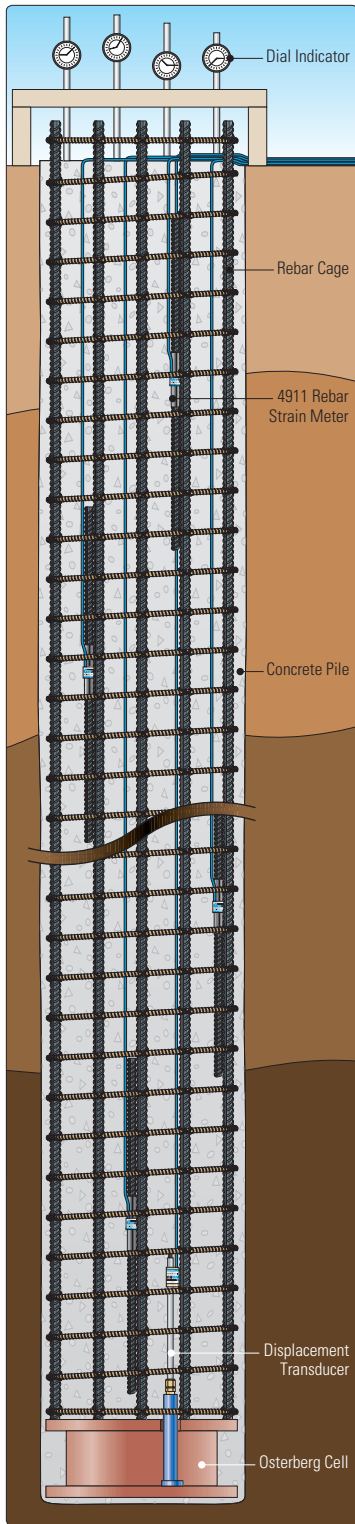
A built-in thermistor enables the measurement of temperatures and aids in the evaluation of thermally induced strains.

Advantages and Limitations

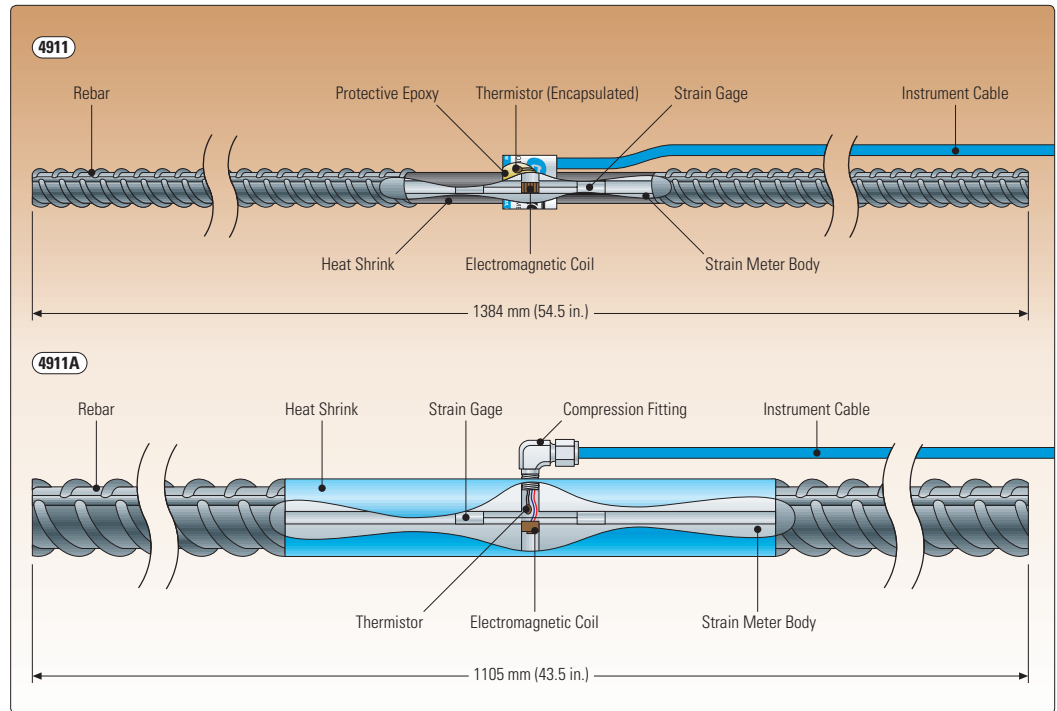
The main advantage of the Model 4911 "Sister Bar" and Model 4911A Rebar Strain Meter lies in their ruggedness. They are fully waterproof and virtually indestructible so that, if the cable is adequately protected, they are safe from damage during the concrete placement.

Each "Sister Bar" and strain meter is individually calibrated and tested for weld strength. The "Sister Bar" is very easy to install, whereas the rebar strain meter requires the services of an experienced welder who can guarantee full strength welds.

The single vibrating wire strain sensor located along the axis of the strain meter is not affected by bending of the strain meter itself. It has the advantage of all vibrating wire sensors, namely: long term stability, can be used with long cables and is relatively unaffected by moisture intrusion into the cables.



● Installation of the Model 4911 in an Osterberg Cell pile test. (For more information regarding Osterberg Cell pile testing, please contact Loadtest, Inc. — www.loadtest.com).



● Illustration of the the Model 4911 "Sister Bar" and Model 4911A Rebar Strain Meters and their various components.

System Components

A vibrating wire strain gage sensor is fixed axially inside a short, central length of round steel bar. This central section is de-bonded from the surrounding concrete by means of a plastic coating, and is extended by welding a length of rebar to each end. The Model 4911 "Sister Bar" comes in one size only (#4 rebar (approximately 12mm)) whereas the Model 4911A Rebar Strain Meter is available in various sizes to match the size of the rebar cage into which it is to be welded.

The signal cable attached to the strain sensor extends to the readout location where the signals can be monitored using either a Model GK-401 or GK-403 Readout Box, or a Micro-10 Datalogger. A thermistor is included inside each sensor so that temperatures at the sensor can be measured.

Technical Specifications

| | 4911 | 4911A |
|---------------------|--------------------|-------------------------|
| Standard Range | 2500 $\mu\epsilon$ | 2500 $\mu\epsilon$ |
| Resolution | 0.4 $\mu\epsilon$ | 0.4 $\mu\epsilon$ |
| Accuracy | $\pm 0.25\%$ F.S. | $\pm 0.25\%$ F.S. |
| Nonlinearity | < 0.5% F.S. | < 0.5% F.S. |
| Temperature Range | -20°C to +80°C | -20°C to +80°C |
| Rebar Sizes | #4 (Sister Bar) | #6, 7, 8, 9, 10, 11, 12 |
| Length | 1384 mm | 1105 mm |
| Output ¹ | 1800-2800 Hz | 1800-2800 Hz |

¹Approximate output.



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