



The distometer ISETH is a precision instrument to take length measurements by means of invar wires. Above all it helps to determine the exact changes in distance and length in case of displacement and deformation measurements. It has been developed from the Institut für Straßen-, Eisenbahn- und Felsbau der Eidgenössischen Technischen Hochschule Zürich (ISETH = institute for road, railway and rock construction of the Technical University of Zurich, Switzerland).

The complete measuring device consists only of mechanical elements. Therefore it is extremely reliable and can be used independent of other equipments. The measurements can be performed very quickly and with a few personnel.

The length of the invar wire is between 1 and 50 m. The measuring range for length changes is 100 mm. The measuring accuracy in case of wire lengths until 10 m is around 0.02 mm, in case of longer wires approximately $\pm 2 \cdot 10^{-6}$ of the distance (average error).

The length measurement device with an invar wire consists of three essential parts: the load transducer, the length transducer, and the invar wire. The distometer ISETH combines load and length transducer in one handy instrument (see Fig. 1).

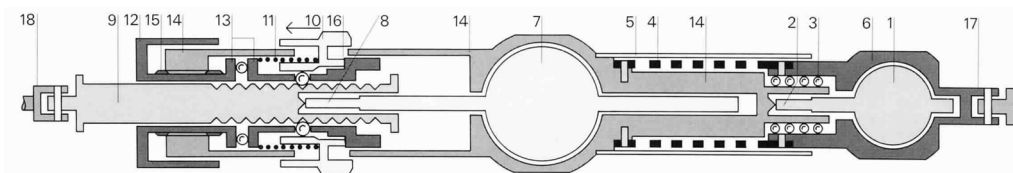


Fig. 1 Scheme of a distometer: **1** Dial gauge to measure the spring extension; **2** Transducer; **3** Axial ball bearing; **4** Precision steel spring; **5** Protective tube; **6** Connection between dial gauge and precision steel spring; **7** Dial gauge for length measurement; **8** Transducer; **9** Drag-bar with notches for coarse movements; **10** Ring to release the notch; **11** Pressure spring to press the ring 10 at the notch 16; **12** Turning ring for fine adjustment of drag-bar; **13** Ball bearing; **14** Instrument body; **15** Clamping nut; **16** Notch; **17, 18** Couplings



The load transducer keeps the required tension stress of the invar wire during the measurement. It consists essentially of a precision steel spring, whose extension is the degree for the tension working on the invar wire. The extension of the spring can be adjusted to a desired value by means of a dial gauge.

A second dial gauge serves as length transducer which delivers the measured value. It measures the distance between distometer and the end of the invar wire that is fixed there.

In case of a constant pretension the invar wire has a constant and largely temperature independent length. The wire is equipped with precision couplings that allow the perfect connection between the distometer at one end and the measuring point at the other end.

The equipment is completed by measuring rods at the object to be measured and by two articulated connections which are inserted between rod and invar wire and between rod and distometer (Fig. 2).

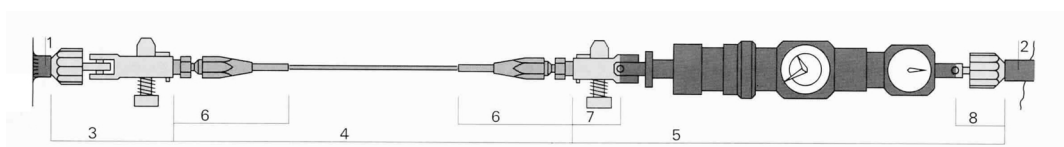


Fig. 2 Distometer equipment ready for measurement: **1** Measuring rod, welded; **2** Measuring rod, concreted; **3** Articulated connection with clamp for wire couplings; **4** Invar wire; **5** Distometer ISETH; **6** Wire coupling; **7** Clamp for wire-coupling at distometer; **8** Articulated connection at distometer

For each distance to be measured the invar wire is cut to the necessary length on-site and equipped with a coupling at both ends.



For subsequent measurements the single wires are reeled on a thimble. A compensator fixes the free end of the measuring wire at the thimble. In a wooden transportation box you can store up to fifteen thimbles.

The quality of the measuring values depends on the indication of the dial gauges in the load transducer and in the length transducer of the distometer. For control, calibration and adjustment the calibration gauge is used. It consists of two end boards which are connected by three invar rods. These rods give them the constant distance, necessary for the length calibration.

To calibrate the load transducer a standard weight is used, which is fixed at the distometer that hangs vertically in the calibration gauge. An indication deviating from zero can be corrected by turning the face of the dial gauge. Thus the ageing of the spring can be controlled at any time and a usual zero point derivation can be corrected.

To calibrate the length transducer the distometer is attached between the two end boards of the calibration gauge by means of the articulated connections. After having adjusted the necessary load at the load transducer the length transducer indicates the calibration value of the distometer. Mathematically or by turning the face an eventual change can be taken into consideration.

The comparability of the measuring values depends on the constant length of the invar wires as well as on the calibration of the distometer. Thus it is necessary to calibrate before and after each measurement.

We are realising distometer measurements, delivery and installation of the measuring rods and we are producing invar wires to customer's order. If desired we're also evaluating the measuring results and we're formulating geotechnical statements.

**Sales Information**

- 2.2.2.1 Invar wire, d = 1.0 mm
- 2.2.2.2 Invar wire, d = 1.65 mm
- 2.2.2.3 Wire compensator
- 2.2.2.4 Thimble
- 2.2.2.5 Precision coupling for invar wire, d = 1 mm
- 2.2.2.6 Precision coupling for invar wire, d = 1.65 mm
- 2.2.2.7 Measuring rod, brass, l = 75 mm, to set in cement
- 2.2.2.8 Transportation box for 15 thimbles
- 2.2.2.9 Distometer with calibration device and transportation box