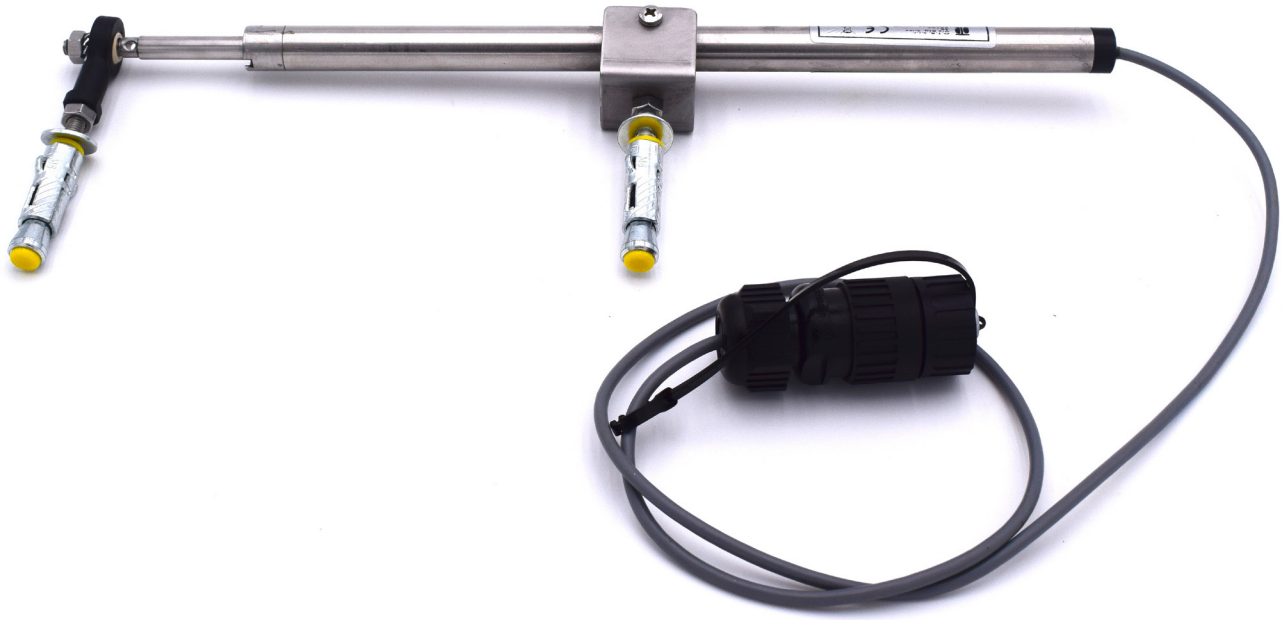

Electric Crackmeters

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Numero 007
Rev. 04 del 27/04/2022

STRUMENTI E MISURE GEOTECNICHE
E STRUTTURALI

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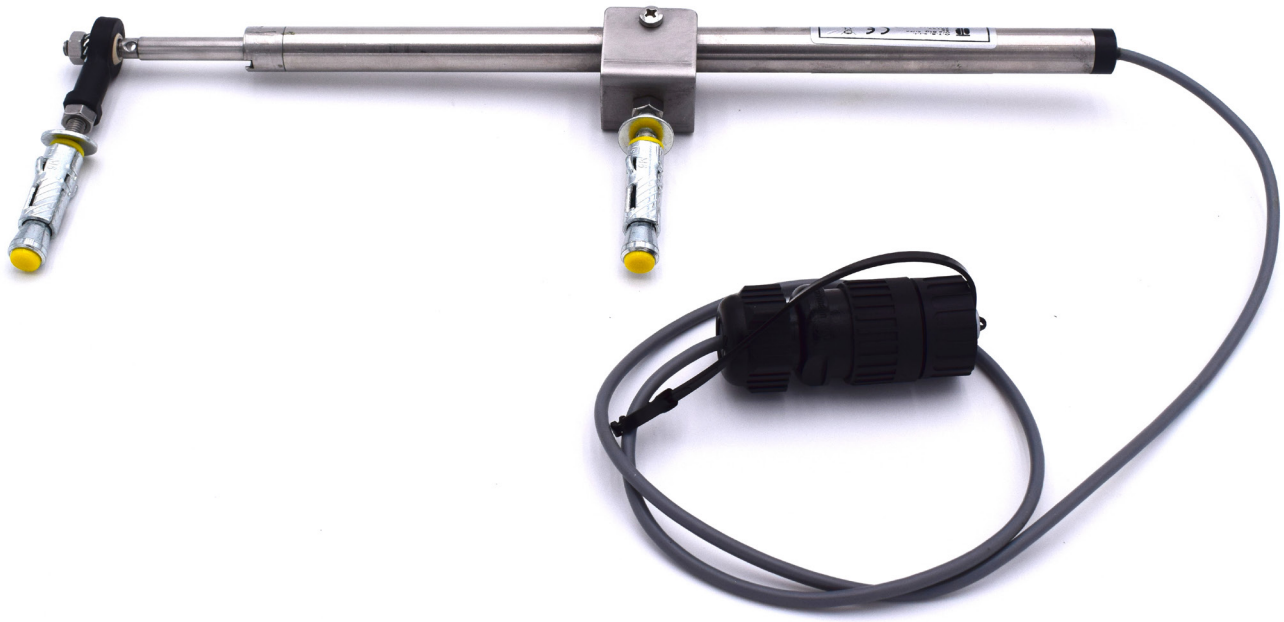

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WARNINGS

This instrument must be utilized only for the application it has been designed for, OTR declines all responsability for any improper use;

Do not connect the instrument to the readout unit with wet hands;

During the installation phase, disconnect the instrument from measuring devices or from any device connected to the AC power supply;

Do not use the instrument in water where an electric dissipation is in progress;

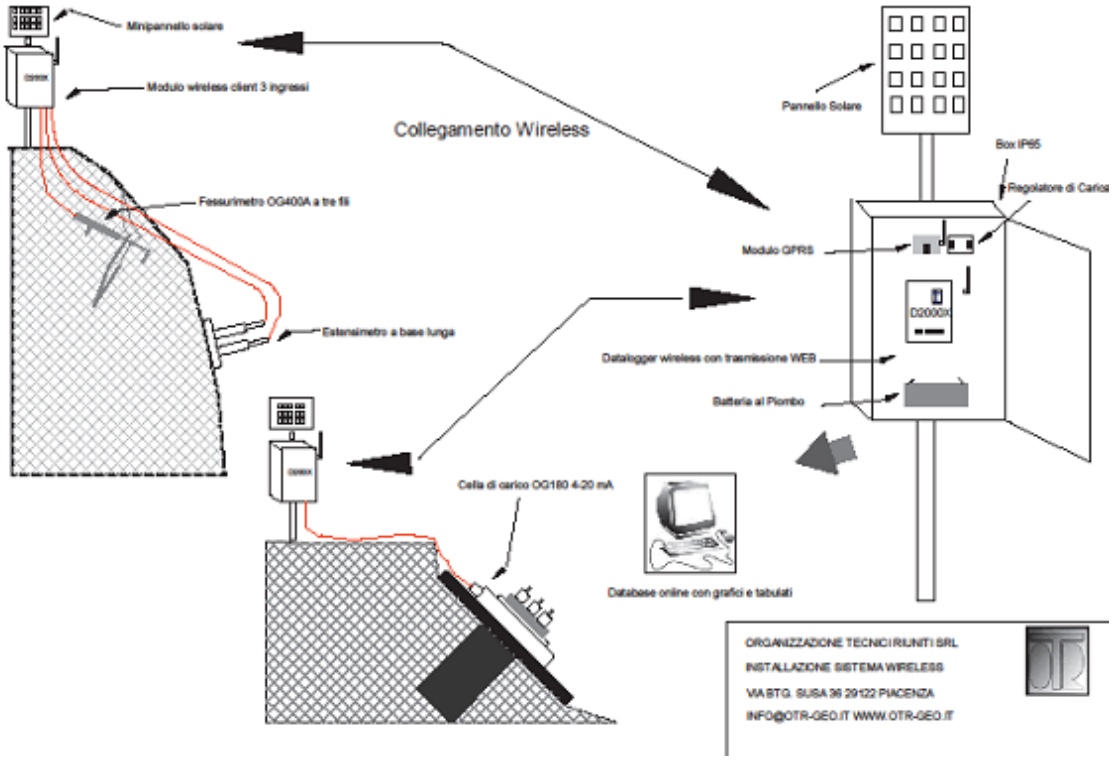
Use protective gloves;

Furthermore

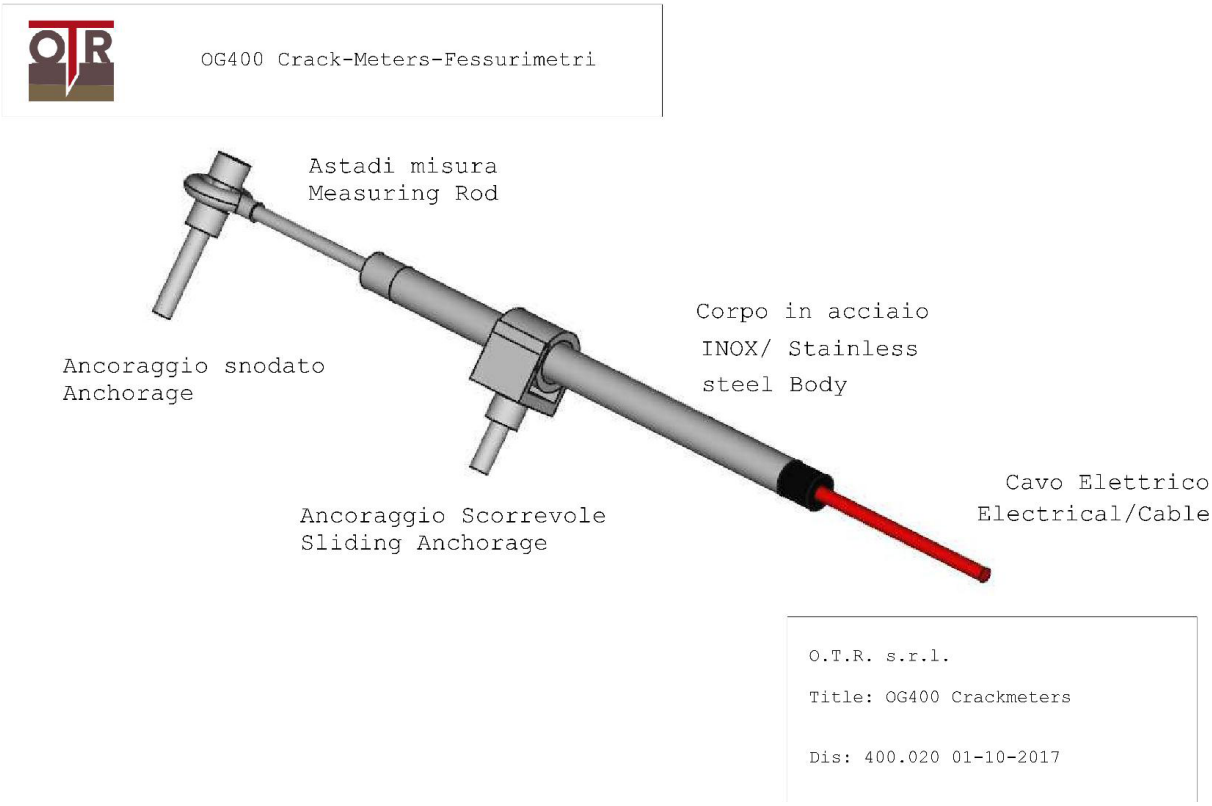
- Do not open the instrument, contact the manufacturer for checks and repairs;
- Keep out of reach of children;
- Clean the instrument and its cable with alcohol or water, do not use acetone or aggressive liquids for plastics or labels;
- Use surge arresters for installations with unprotected cables longer than 30 meters.

Application

Crackmeters are used for monitoring superficial cracks in civil and historical buildings and monuments, rock faces, rock masses, bridges, viaducts, or structural joints in concrete dams. Crackmeters are installed across a crack or joint, and they detect the relative movements of its two sides.
A crackmeter (or jointmeter) monitors the variations in the opening or closing of the crack on which it is installed by means of a measuring rod connected to a transducer.



Description



Electrical crackmeters consist of a waterproof steel cylinder which houses a displacement transducer. Two anchoring units are located at the two ends of the instrument, so that it can be installed across a crack or joint. Electrical crackmeters are available in two versions: one is equipped with a potentiometric transducer (with a signal expressed in mV or mA) and the other features a vibrating wire transducer. They can be customized with different measuring ranges according to any requirement or application.
The relatively low electrical resistance of the transducer makes it rather insensitive to interference and external electrical noise, even at medium distances.
The instrument can be equipped with a 4-20 mA converter with a terminal box and minibox. The mm output can be measured by a portable readout unit or by a data logger.

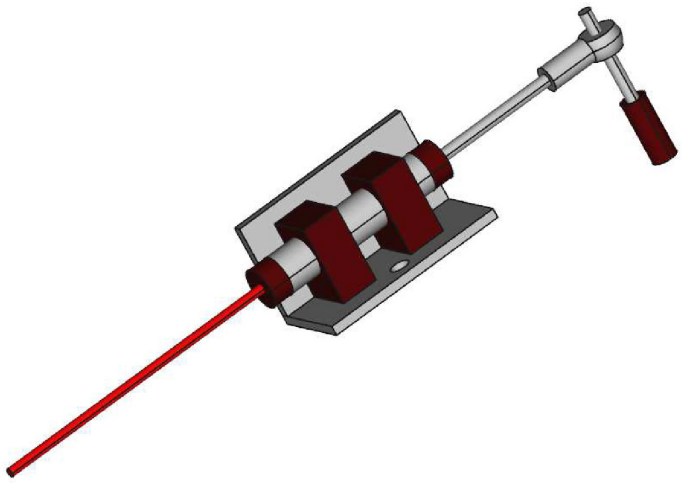
Identification

Every crackmeter has got a plate that indicates:

- Serial number;
- Model;
- Full scale:
- Input/Output;

Technical Features

Body material	Stainless Steel
Full scale	25-50-100 mm



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Installation

Electrical crackmeters are supplied as a preassembled unit, therefore the installation procedure is relatively simple. The available models differ as for some mechanical features, especially in the type of anchoring system for wall installation, and so the installation procedure will have to be adapted accordingly.
Here follows the general installation procedure:

- Prior to installing the instrument, take a control reading with the readout unit, in order to establish the initial position of the instrument so as to have a pre-set initial measurement. Normally, the instrument rod is placed at half of the measuring range;
- Position the instrument and its anchoring plugs across the crack, making sure the instrument is aligned with the expected direction of the displacement;
- Mark the position of the holes for the anchoring plugs on the wall;
- Drill the holes for the anchoring plugs;
- Insert the plugs in the holes and tighten the hex head bolts until the anchoring plugs are completely tightened;

- During the installation, take some readings with the readout unit in order to make sure that the instrument is positioned as planned.
- It is possible to adjust the position of the instrument even after it has been installed.

This feature is very usefull once the instrument has been on site for a while and has got towards the end of its measuring range. In that case, it is possible to reposition the instrument and bring it to the initial position by following the procedure described below:

- Loosen the grub screw on the transducer's calibration cylinder;
- Adjust the position of the cylinder so as to position the internal measuring rod in the desired position;
- Tighten the grub screw on the transducer's calibration cylinder.

Remember to take measurements before and after adjusting the instrument position, in order to process data correctly.

Calculation Notes

- If there's not indicated on the calibration sheet sensor's outputs encrease extracting shaft from the trasducer. If the trasducer is on a wall crack the mesure will encrese if the crack enlarge.
- Warious step on the calibration sheet starts from a zero position where the shaft is slightly entracte from his maximum closing position. ;
- Mantaining a maximum excurtion equal or superior of the nominal one is a good rule to avoid the instrument's use out of the calibration range. (higher than 0 and lower than maximum);
- The maximal mechanical excurtion, just like his run, is higher than the full scale of the innstrument;
- You can execute different type of calcs of the sensibility using data sheet's calibrations. It can be use a 2° degree polinomial formula;
- Other calculations mood, in a normal differential movement from the origin, usually don't bring different results than the previous regolation cited.

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Instrumental Readout

You should use, to take mesures, manual or automathical instruments. Geotester 2 highlight on the display fisic or potentiometric mesure units. The use is reported on their own manual.

Taking Measurements

In order to take measurements, it is necessary to connect the instrument cable to the readout unit, following the instruction manual of the readout unit being used:

The instrument's signals may differ depending on the type of sensor, potentiometer, vibrating wire or converter (mV or mA) being used.
Displacement transducer with output signal expressed in mV:

Blue Cable	= + V reference *
Brown Cable	= GND*
Black Cabl	= Loop*
Shield	= Earth on Datalogger

* Refer always to calibration report associated to instrument

Displacement transducer with output signal expressed in 4-20 mA:

Red cable	= + 15 volt
Black cable	= Loop
Shield	= Earth on datalogger

Displacement transducer with output signal expressed in Hz (vibrating wire instrument):

Red cable	= + signal
Black cable	= - signal
Green cable	= Temp
White cable	= Temp
Shield	= Earth on datalogger

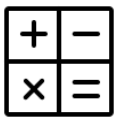
Data processing

Depending on the instrument and measurement unit, the electrical reading can be expressed in mV, mA or in Hz to be converted into mm using the sensitivity factor shown on the calibration sheet provided by the manufacturer of each instrument:

Calculations & Formulas

The displacement measurement is given by the tension reading (mV) or by the output current reading (mA) or by the frequency reading (Hz) taken by the electrical displacement transducer.

L = Reading expressed in engineering units [mm]
E = Electrical reading (mV, mA, or Hz)
K = Sensitivity factor (shown on the calibration sheet)



L (mm) = ExK (Reading expressed in engineering units [mm])

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