

TDRi Series

Distributed Measurements of Soil Movement

Time domain reflectometry (TDR) is a versatile technique that has several geotechnical applications. It is a reliable tool for the measurement of rock movement. It can improve safety and increase operating speed by providing real-time deformation data.



Why use the TDRi Series?

The TDRi Series are hassle-free systems that help engineers and mine operators to ensure security and follow the exploitation effects in real time. GKM Consultants' TDR systems find applications mostly in deformation and stability monitoring of structures, slopes and mines.

They have been implemented in open-pit mines to measure bench stability. They are also often used in underground mines as a means to monitor in real time any shaft wall or gallery roof deformation. Other applications include measuring rock breakage from cliffs and excavations, and use in tunnels to measure delamination or shear of rock layers. It can also be used for structural health monitoring to measure deformation in large structures such as roads, bridges or dams. In short, they can be used to measure the position and estimate the amplitude of any kind of deformation in a wide array of media.

GKM Consultants provides assistance at every step of the way, from the selection of the right cable to the design and construction of the data acquisition systems and the installation and configuration of the TDRs themselves.

How do they work?

The TDRi Series work on a similar principle to radar, where an antenna emits radio waves towards items whose position needs to be estimated. By measuring the return time and reflection patterns of the radio wave, we are able to pinpoint the location of an object. Rather than generating radio waves, a TDRi system sends an electrical pulse down a coaxial cable. If the latter is kinked, extended or damaged, the propagation of the electrical pulse is disturbed and some voltage is sent back towards the emitter. By measuring this return time, it is possible to pinpoint the location of any deformation in the cable and evaluate the root cause.

Technical Features

▣ Packaging

GKM Consultants' TDRi Series products are fully functional systems. They include the measurement coaxial cables and the acquisition systems. With these turnkey systems, users can manage their data acquisition according to their needs.

▣ Cable length

GKM Consultants' TDRi Series cables can be hundreds of meters long, ensuring accurate localization of faults and shear over considerable distances.

✔ Expertise

GKM Consultants provides expert knowledge to help you choose the best location, TDRi Series cable type and length, and data platform for your monitoring requirements. Our TDRi Series are all inclusive from instrument choice to installation of the instrument and data visualization.

✔ Other measurements

Other parameters can be monitored using GKM Consultants' TDRi Series. Because the propagation of the electrical pulse is influenced by the electric properties of the medium surrounding the TDR sensor, information such as soil volumetric content or bulk electrical conductivity can be estimated. Specific sensors for this application are also offered by GKM Consultants.

Options

✔ Portable TDRi Series

GKM Consultants offers portable TDRi Series. These can be used to record data from several individual TDR cables with a single measurement system. They are a low-cost option designed for situations where real-time measurements are not required.

✔ Automated TDRi Series

Automated TDRi Series contain a data acquisition system which manages automatically all data acquisition. It can be programmed to acquire data at specific times or under specific conditions. Up to 16 TDR cables can be connected to a single automated TDR Series.

✔ Power

All of GKM Consultants' TDRi measurement systems can be battery powered for autonomy in remote areas and difficult-to-reach sections of a project.



TDRi Station

Technical informations

✔ Pulse generator output

250 mV into 50 ohms

✔ Output impedance

50 ohms

✔ Electrostatic discharge protection

Internal clamping

✔ Operating temperature range

-40 °C to +55 °C

✔ Power consumption

300 mA @ 12V DC