

## COMPREHENSIVE MONITORING SOLUTIONS

**A monitoring installation lets you detect displacement or movement in natural and manmade structures. It provides the data you need to understand the speed, direction and magnitude of any motion. The software is the core of your monitoring project. It controls the measurements, manages and analyzes the data, triggers alarms, and provides decision support.**

Trimble® 4D Control brings the latest technology to installations for monitoring and analysis. Trimble 4D Control provides advanced, easy to use functionality that fits a wide range of monitoring needs.

- Attract new clients and new business by providing monitoring services.
- Create comprehensive monitoring systems using GNSS receivers, optical total stations and geotechnical sensors.
- Enhance and customize your monitoring capability to address a wide range of applications.
- Measure, analyze, visualize and report on your monitoring projects.
- Manage your system and view results from remote locations.

## FLEXIBLE MONITORING SOLUTIONS FOR DEMANDING NEEDS

Trimble 4D Control lets you create monitoring solutions for a variety of projects. The flexible workflow makes it easy to put your monitoring system into action:

- Mining – Trimble monitoring solutions can be used in open pit and underground mines for monitoring highwalls, tunnels, subsidence and stockpiles.
- Construction – Monitor motion in buildings and structures adjacent to construction sites. You can monitor cut and fill slopes and incomplete structures.
- Engineering – Track the motion of dams, bridges, buildings and other man-made structures.
- Transportation – Monitor transportation structures, cut and fill slopes and railways. You can also monitor structures close to transportation corridors during construction and operation.
- Utilities – Monitor pipelines, transmission structures, production and storage facilities.
- Tunneling – Monitor new and existing tunnels for deformation. Monitor for surface subsidence above tunneling projects.
- Geotechnical – Monitor dams and levees, landslides, landfills, subsidence, faults and natural structures.

## MODULAR SOFTWARE DELIVERS POWER AND EASE OF USE

Trimble 4D Control uses modern software architecture to create a solution that is robust, productive and easy to manage. Tightly integrated systems of sensors, communications and computations ensure consistent operation and seamless data flow.

Trimble 4D Control is designed to grow with your business. The scalable software allows you to add instruments, sensors and functionality as your needs change and expand.





## TRIMBLE 4D CONTROL SOFTWARE HANDLES THE WORK FOR YOU

With high-level functions for visualisation, analysis and alerting, Trimble 4D Control gives you the information when and where you need it. Fully automatic operation eliminates frequent site visits or operator interaction.

### COMPLETE SENSOR MANAGEMENT

Trimble 4D Control manages all of your sensors. It measures and stores the data according to schedules that you define.

#### TRIMBLE GNSS



Trimble GNSS provides continuous high precision measurements and rapid updates to monitor over long distances. Compact and rugged, the Trimble NetR9 GNSS Reference Receiver is capable of tracking all existing and planned GNSS signals.

#### TRIMBLE S8 TOTAL STATION



Trimble 4D Control provides support for the Long-Range Trimble S8 for precise monitoring of points up to 2,500 meters away. You also can conduct scheduled, automated calibration of the compensator on the Trimble S8.

#### TRIMBLE REF TEK SENSORS

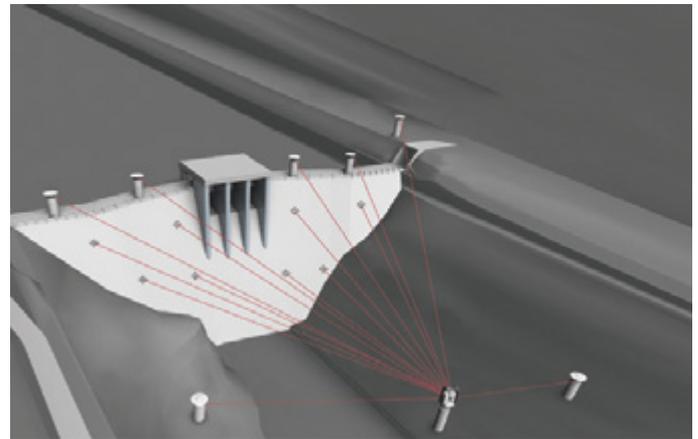


Trimble 4D Control supports peak acceleration using REF TEK hardware, storing the data in the Monitoring database. Trimble 4D also supports a broad array of 3rd-party geotechnical and meteorological sensors.

### AUTOMATED MEASURING 24/7

With Trimble 4D Control you can define groups of points to be measured and schedules for observation. For optical measurements, you can simply 'train' the system by aiming the Trimble S8 Total Station to each point when setting up your project. The system then automatically measures to the

points according to schedules that you have defined. For GNSS monitoring, you can control measurement intervals, cutoff angles and other parameters used in processing the GNSS data. For maximum flexibility, Trimble 4D Control lets you choose among different GNSS processing techniques to ensure the best results for your monitoring project. Trimble 4D Control collects and manages data from geotechnical sensors to provide complete monitoring functionality.



### ADVANCED DATA ANALYSIS AND VISUALIZATION

Trimble 4D Control contains sophisticated tools to analyze your data. At the core are Trimble's cutting-edge algorithms for network deformation analysis. Trimble 4D Control provides detailed evaluation of your data and highlights points that are moving. You can identify random or systematic measurement errors and spot movement in your points. Trimble 4D Control helps you see cyclic movement as well as sudden or unexpected changes in your project.

Visualization tools in Trimble 4D Control provide a versatile overview of your monitoring network. Trimble's rigorous computations and powerful graphics let you conduct analyses of complex structures and motion.

### ADVANCE CLOUD COMPUTING WITH TRIMBLE 4D LITE

Many monitoring projects do not require continuous measurement. Survey teams can visit the sites at defined intervals and make measurements to specified targets. With Trimble 4D Lite, surveyors, engineers and scientists can do campaign level processing of data without the need to integrate directly with on-site hardware or sensors. T4D Lite is a cloud-based web application that is designed with the same advanced web interface and back-end stability that you have come to expect with Trimble's 4D Control software. T4D Lite supports Google Maps, Custom Views, Charts, Scatter Plots and the ability to preform complex analysis of data. The monitoring system supports over 20 different types of sensors including position sensors, total stations, strain meters, data loggers, tiltmeters and weather stations, enabling you to create a full Monitoring Solution.



- Inspect the entire network at a glance and use color-coded information to highlight motion or changes.
- Select specific points for detailed inspection and see charts showing the displacement of the points over time.
- Use Trimble 4D Control analysis functions to combine data from multiple sensors in a single chart.

With Trimble 4D Control you can define the direction of movement expected for each point. The point's motion is computed along or across this axis as well as in the vertical plane. It's a powerful tool in understanding the behavior of your monitoring project.

**RESULTS AND ALERTS TO KEEP YOU INFORMED**

Trimble 4D Control routines for alarm management can send messages and alerts when necessary. You can set the tolerances and conditions for alarms and tell the system who should be alerted. Trimble 4D Control sends alerts via e-mail and text messages to specified recipients.

Advanced users can also use SQL to retrieve raw data directly from the database. They can then conduct custom analysis using information collected and stored by the system. And you can use remote access and Trimble 4D Control Web to get up-to-the-minute information at remote locations.

**WEB ACCESS TO YOUR MONITORING PROJECTS**

Trimble 4D Control Web provides access to your monitoring system via a fast, feature-rich Web interface. Whenever you connect to the Internet, you can connect to Trimble 4D Control and view your project in real time.

- Powerful map and custom views let you see your project and quickly identify sensors and measurement points. The system can display status and measured data updates for each sensor. You can use aerial photos or other imagery to provide detail background information.
- Fast and easy charting lets you plot the results of individual points or sensors.
- Use Trimble 4D Control analysis functions to visualize information from monitoring sensors in chart or tabular forms. Trimble's rigorous computations and powerful graphics let you conduct analyses of complex structures and motion.
- Trimble 4D Control lets you link to project webcams. You can see your project in real time and make visual inspection from any location.
- Keep a project log of events and reminders. You can post manual or automated updates to the log and manage postings to meet stakeholders' needs.
- Manage alerts and alarms in secure environment. Trimble 4D Control Web lets you set conditions for issuing alerts and messages. You can define individuals or groups of stakeholders to receive updates via email and text messages.
- Controlled access to specified stakeholders keeps your information secure. You can assign different access levels to ensure information is available only to those who need it.

**TRIMBLE NETR9 GNSS REFERENCE RECEIVER**

The Trimble NetR9 GNSS Reference Receiver is a versatile GNSS receiver for monitoring and infrastructure applications. It provides maximum functionality for high-precision GNSS projects.

- Rugged and reliable operation in harsh environments.
- Flexible communications including Ethernet, Bluetooth, USB and Serial. Remote configuration via built-in Web interface.
- Unparalleled GNSS performance; capable of tracking GPS, GNSS, Galileo, Compass and QZSS signals.
- Integrated power source and memory ensures uninterrupted data tracking and storage.
- Supports the Trimble Ag25, Trimble GNSS Choke Ring, and the Trimble Zephyr™ 2 GNSS geodetic antennas.



*NetR9 (monitoring version)*



*AG25 antenna*

**TRIMBLE S8 TOTAL STATION**

The Trimble S8 Total Station is the key to high precision measurements in your Trimble monitoring system. Packed with Trimble's advanced total station technology, the Trimble S8 Total Station gives reliable performance 24 hours per day.

- Frictionless MagDrive™ servo technology measures up to 40% faster than conventional servo instruments.
- Silent operation allows you to measure unobtrusively—even in highly populated settings.
- Trimble FineLock™ Technology gives you greater flexibility in placing your prism targets. Trimble's Long-Range FineLock extends to 2,500 meters.
- Precise Measurement: Up to 0.5" in angles and 0.8 mm + 1 ppm in distance (ISO017123-4).
- Trimble DR Plus™ EDM can measure to objects more than 1 km away—without the need for a prism.



*Trimble S8*



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