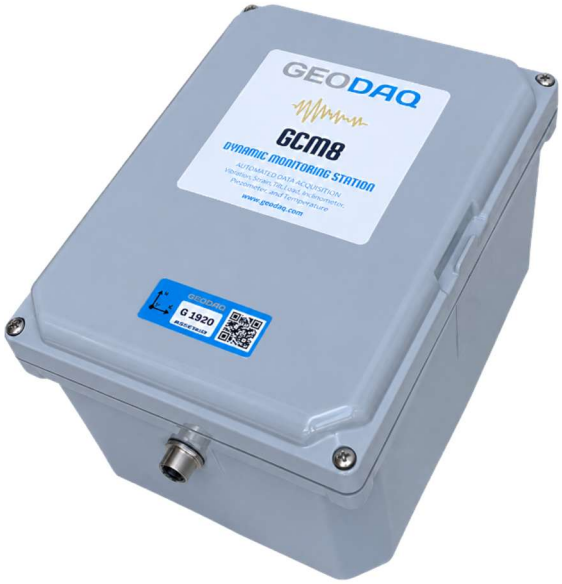
GCM8 Datasheet

Dynamic Monitoring Station

AUTOMATED MONITORING SOLUTIONS

www.geodaq.com

The GCM8 Dynamic Monitoring Station is a field-deployable remote data acquisition platform designed for unattended monitoring of vibration, noise, air quality, GNSS position, and geotechnical/structural instrumentation. The system integrates the 8th-generation GCM8 controller into a compact, rugged NEMA 6P / IP68 enclosure with 4G LTE, LoRa, Bluetooth, Wi-Fi, RS-232, and RS-485 connectivity. The station can be configured with an internal tri-axial geophone for self-contained vibration monitoring or used as a gateway for externally mounted sensors and distributed RADAQ modules.



GCM8 Dynamic Monitoring Station

Integrated Monitoring and Edge Processing

At the core of the station is the **GCM8 controller**, a dual-core 32-bit data acquisition and communications platform designed for high-frequency sampling, local processing, and secure remote data transmission. In addition to supporting externally connected data acquisition modules and sensors, the GCM8 can include internally mounted sensors for three-axis vibration monitoring, GPS position documentation, and high-resolution tilt measurement.

Internal tri-axial geophone

For vibration monitoring applications, the station may be equipped with an internal high-sensitivity tri-axial geophone to create a compact, self-contained monitoring system for blasting, pile driving, demolition, heavy construction, and structural response monitoring. The station can

also support externally mounted geophones or velocity sensors when sensor placement away from the enclosure is required.
For temporary ground-surface installations, four threaded spikes can be mounted at the bottom corners of the GCM8 enclosure to improve coupling with the ground surface.

Internal GPS Sensor
Each GCM8 Dynamic Monitoring Station is equipped with an internal GPS sensor and antenna to record latitude, longitude, and altitude coordinates for documenting the location of each monitoring station and associated vibration measurements. GPS position logging can be enabled or disabled remotely at any time during the monitoring period.

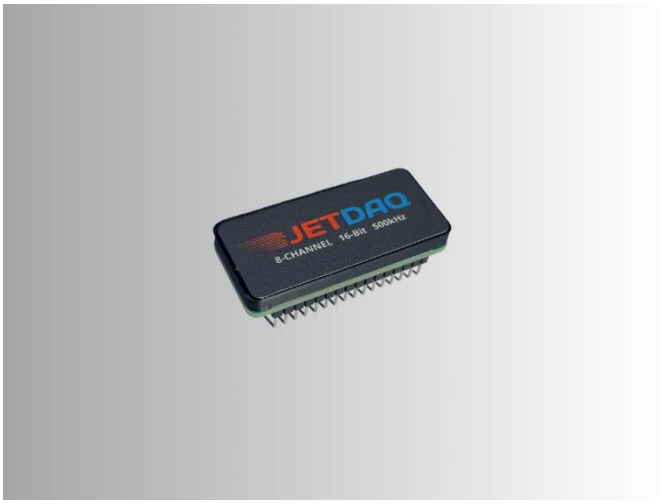
Internal High-Resolution Tilt Sensor
The GCM8 can be equipped with a high-resolution tri-axial tilt sensor module to establish the orientation of the internal tri-axial geophone and monitor changes in rotation when the station is mounted to structural elements or other non-ground-surface locations. This provides a direct measurement of the horizontal and vertical orientation of the vibration sensor.
With a tilt resolution of less than **0.006 degrees**, the GCM8 can document small rotational changes that may occur during vibration-generating activities or over longer monitoring periods.

Depending on configuration, the GCM8 Dynamic Monitoring Station can support up to three external tri-axial velocity sensors or geophones, allowing synchronized multi-point vibration monitoring from a single gateway.

High-Speed Data Acquisition

The GCM8 has two slots for JETDAQ modules capable of acquiring analog input signals at over 30,000 samples per second per channel on all 8 input channels. The JETDAQ module is an integrated data acquisition system with a 16-bit analog-to-digital converter, front end signal conditioning circuitry to filter and amplify each input, and overvoltage protection up to +/- 20V on each input channel. The JETDAQ module plugs into header slots mounted on the GCM8 as shown on Figure 1. The JETDAQ 1 module is used for signal acquisition when a vibrating wire interface module (VWM) is used, and can be used for analog sensors if when the VWM is not used.

Monitor both dynamic and static signals. Dynamic applications include vibration monitoring, seismic response and impact loading. A low drift voltage reference with accurate gain trimming on each channel ensure very accurate DC level static measurements that remain stable over long term monitoring periods. Each input channel can be remotely configured to set the input range (programmable gain amplifier) and signal polarity (unipolar or bipolar).



JETDAQ Module

RADAQ Module Expansion

The GCM8 Dynamic Monitoring Station also serves as a gateway for the **RADAQ Remote Automated Data Acquisition** ecosystem. RADAQ modules allow the station to be expanded beyond vibration monitoring to include air quality, noise, GNSS position monitoring, and other sensor types.

Sensor data from connected modules can be time-synchronized and transmitted to a secure cloud platform using a carrier-agnostic **4G LTE** connection. This unified data stream allows project teams to review vibration, noise, dust, position, and geotechnical data from a single remote monitoring system.

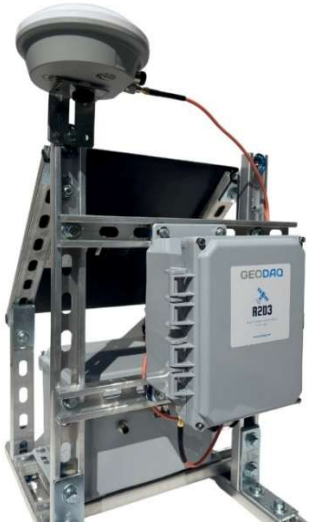
RADAQ	DESCRIPTION
GEO3	Tri-Axial Geophone or MEMS Velocity Sensor for Vibration Monitoring
ST500	Sound Level Node for Outdoor Noise Monitoring
R2D3	High-Precision GNSS Position Monitoring in 3 Directions (XYZ)
AQ2	Air Quality Sensor Node for Dust Monitoring

Rugged Field Deployment

The station is designed for long-term field deployment in harsh outdoor environments. The weatherproof enclosure protects the controller, communications hardware, power management electronics, and optional internal sensors from dust, water, and weather exposure.

For projects requiring flexible monitoring locations, the GCM8 can be supplied as a portable remote monitoring station mounted on a sturdy field stand. The portable configuration includes an integrated battery, solar panel, and charge controller for continuous unattended operation where fixed site power is not available. This allows the monitoring station to be relocated around the project perimeter or moved to different work areas as construction activities change.

The enclosure is suitable for direct mounting to walls, poles, posts, structural members, or the portable field stand, allowing the station to be installed where monitoring is required while minimizing site disruption and setup time.



Portable Remote Monitoring Station with R2D3 and Solar Power System

Power and Health Monitoring

- Internal monitoring of system voltage, current, and temperature
- Remote review of station status and operational health
- Designed for continuous unattended operation

Installation Benefits

- Compact enclosure for pole, wall, post, or structure mounting
- Supports self-contained or distributed sensor layouts
- Remote configuration and operation reduces field visits

Typical Applications

Key features of the GCM8 Dynamic Monitoring Station include:

MONITORING	MEASUREMENTS AND FEATURES
Construction Vibration	PPV, frequency, event waveforms, unattended monitoring, automatic report generation
Landslide Movement	High-precision GNSS three-dimensional displacement and movement trends
Construction Noise	Sound level, time history, exceedance documentation

Dust and Air Quality	PM1.0, PM2.5, PM4, PM10, environmental conditions
Excavation Support	Strain gauges on struts, walers, rakers
Blasting	Vibration levels, frequency and peak stresses
Structural Health	Multi-point displacement, velocity and strain
Dams	Piezometers, GNSS displacement
Pile Testing	Load, displacement, vibrating wire and electrical resistance strain

Communications and Connectivity

The GCM8 Dynamic Monitoring Station supports multiple communication interfaces for remote and local data access, sensor integration, and field configuration.
Available communication options include:

INTERFACE	FUNCTION
4G LTE	Remote cloud data transmission
LoRa	Low-power wireless sensor communication
Bluetooth	Local setup, service, or diagnostics
Wi-Fi	Local communications and configuration
RS-232	Serial sensor or equipment interface
RS-485	Long-distance serial sensor network interface

Key Features

The GCM8 Dynamic Monitoring Station is well suited for:

FEATURE	DESCRIPTION
Rugged enclosure	NEMA 6P / IP68 weatherproof enclosure for outdoor deployment
Flexible vibration monitoring	Internal tri-axial geophone or external geophone / velocity sensor configurations
Multi-sensor gateway	Supports distributed RADAQ modules for vibration, noise, air quality, and GNSS monitoring

Remote cloud connectivity	Carrier-agnostic 4G LTE communication for secure data transmission
Local wireless interfaces	LoRa, Bluetooth, and Wi-Fi communication options
Serial interfaces	RS-232 and RS-485 for external instruments and sensor networks
Edge processing	Dual-core 32-bit processor for high-frequency sampling and local data handling
Health monitoring	Remote monitoring of station voltage, current, and internal temperature
Rapid deployment	Designed for field installation with minimal on-site configuration
Long-term operation	Suitable for continuous unattended monitoring on active construction and infrastructure sites