



	PRODUCT CATEGORY:
	EXTENSOMETERS

Tunnel Profile Monitoring System

The RST Tunnel Profile Monitoring System is a series of linked rods, fixed to the tunnel wall, to monitor deformation. A data logging system and related software is available to provide near real time displacement and generate a graphical representation of tunnel performance.

A system of linked arms is affixed to the tunnel wall. Each arm is fitted with a high accuracy displacement sensor and precision tilt meter. Spatial displacement of the pins and arms results in changed tilt and displacement readings. The data logger system automatically collects the data and transmits it to a computer. The computer then analyzes the data, and calculates the displacement profile for presentation.

The system is available in either open or closed loop configurations. The closed loop method is analogous to conventional closed end survey techniques, while the open loop must be referenced to a known location.

> APPLICATIONS

Monitor underground openings during construction for control and safety.

Monitor tunnel deformation due to nearby construction activities.

Monitoring long term deformation and performance of existing tunnels.

> FEATURES

Low profile design, with multiple arms that fit close to the tunnel wall and may be bent in the field to accommodate obstructions on the tunnel wall.

High system accuracy of up to 0.06 mm of deformation.

Custom engineered by RST to suit each individual application.

Digital Bussed System: single cable per arm to simplify installation and reduce cost.

On board electronics to minimize electrical noise problems, and permit tilt sensor calibration independent of cable length effects. Cable length may be changed without affecting sensor calibration.

Uses RST's GeoViewer near-real time software which offers full graphics and alarm capabilities. Contact RST for complete details for ordering.

Integral multi stage transient lightning protection.

No tunnel traffic interference.

Direct measurement of displacement, rather than calculating displacement from a tilt measurement.

Immune to the air density related problems inherent in optical systems.

Built in connectors for manual tape extensometer connection to verify operation, and aid in initial installation and commissioning.

> BENEFITS

✓ **Increase Safety**

✓ **High Accuracy**

✓ **High Reliability**

✓ **Custom Options**



WORKS WITH



READY TO RUN

pre-assembled
pre-wired
pre-tested
pre-programmed



Available for
CUSTOMIZATION
Info on reverse.

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SPECIFICATIONS + ORDERING



Typical installation of the RST Tunnel Profile Monitoring System shows the rods linked together and fixed to the tunnel wall. With the addition of GeoViewer Real-Time Monitoring Software, deformation can be closely monitored and data can be graphically presented over an extended period of time.

SPECIFICATIONS	
DISPLACEMENT SENSOR	
ITEM	SPECIFICATION
Total Mechanical Travel	25 mm
Shock	50 g 11 ms half sine
Vibration	20 g rms 5 Hz to 2 KHz
Life	One billion dither operations
Independent Linearity	0.25%
Operating Temperature	-40 to 80°C
Resolution	Infinite
Accuracy	0.06 mm
TILT SENSOR PARAMETER	
ITEM	SPECIFICATION
Range	±15° (other ranges upon request)
Resolution	±2 arc sec. (±0.0006°) (0.01 mm/m)
Non-linearity	±0.0125% F.S. (±0.002°) (0.03 mm/m)
Repeatability	±0.0125% F.S. (±0.002°) (0.03 mm/m)
Sensor	MEMS (Micro-Electro-Mechanical Systems) Accelerometer, Uniaxial
Operating Temp.	-40 to 85°C (-40 to 185°F)

ORDERING	Available for CUSTOM OPTIONS	Contact RST for Details
ITEM		PART #
Tunnel Profile Monitoring Sensor Arm 1.0 m		ICTPMS010
Tunnel Profile Monitoring Sensor Arm 1.5 m		ICTPMS015
Tunnel Profile Monitoring Sensor Arm 2.0 m		ICTPMS020
4 conductor, 22 gauge polyurethane jacketed cable		EL380004
Tunnel Profile Monitoring System Open Loop Anchor (Anchor, Spacer x2, Bolt/Nut/Washer)		ICTPMSA
Detailed cross sectional drawing of each instrumented segment.		
Plan layout of instrumented segments, and readout location.		
Open or closed loop system.		
READOUTS & DATA LOGGERS		
Ultra-Rugged Field PC ²		IC32000-AR2-RSTS
flexDAQ Data Logger		
SOFTWARE		
GeoViewer: Real-Time Monitoring Software (required for analysis - contact RST for details)		

SYSTEM COMPONENTS	
Tilt/displacement sensor assembly	Manual
Extension tube	Data logger system
Electrical cable sensor to logger	GeoViewer software
Reference pin comes with tape extensometer connector	