

Tunnel convergence monitoring system (ACE-TCS)



Description

Tunnel convergence monitoring system contributes to measure the speed of displacement, rate and tendency of changes in tunnel or underground excavation work.

For measurement of X and Y axis deformation of tunnel inside, it consists of a tilt sensor, a displacement sensor, a mounting bracket and an extension tube as a kit.

Its gage is installed along with internal wall of tunnel by 1~1.5m (In case of single line, kit is 8~10ea. In case of double line, kit is 14~16ea.) not to hinder transportation service.

When happened change of tunnel inside, this change is made the deformation of tilt sensor as much as the change of X-axis. It also makes displacement of length in Y-axis to be output into electrical signals and calculated easily and accurately with provided conversion factor to engineering unit. The first absolute coordinates is made by X, Y-axis, and the displacement can be conversed through current and first value.

ACE-TCS can measure for semi-automatic by contacting signal cables of tilt sensor and displacement sensor to the terminal box.

Or you can control and automatically measure in long distance with data logger. The measured data can be showed in 0.01_{mm} unit in 2D graphic through the web-based management program of **W-Pro**.

Applications

Tunnel convergence monitoring system generally works in

- Monitoring by 2D displacement of the tunnels or underground excavation work
- Measuring the tilted wall of adjacent area in the urbanizing construction work of underground excavation
- Measuring displacement to check for the safety, construction periods and decide excavation speed and proportion

Features

- High resolution by 0.01_{mm} unit
- Minimized impact from construction work
- Easy control & analysis of measured data
- Automatic measurement



[ACE-TCS in Seoul subway]

Tunnel convergence monitoring system (ACE-TCS)

Specification

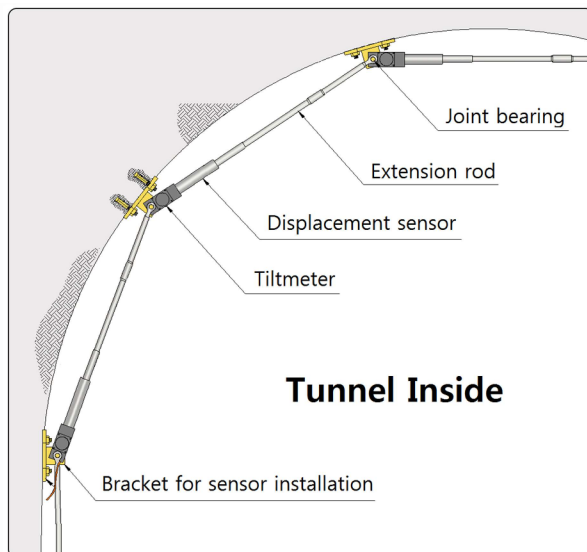
Model	ACE-TCS	
Sensor element	MEMS tilt sensor	VW displacement sensor
Range	$\pm 5^\circ$	20mm
Resolution	5 arc seconds	0.005mm
Accuracy	$\pm 0.1\%$ FSR	
Nonlinearity	$\pm 0.5\%$ FSR	
Operating temperature	-30~80°C	
Built-in temp. device	–	Thermistor (3k Ω)
Temp. device range	–	-30~105°C
Temp. device accuracy	–	$\pm 1^\circ\text{C}$
Materials	Stainless steel, Aluminum processed good	
Signal cable	$\varnothing 6.4\text{mm}$, 0.37mm ² × 4C shielded PVC sheath cable	$\varnothing 4.5\text{mm}$, 0.24mm ² × 4C shielded PVC sheath cable
Accessories	① Mounting bracket ④ 3/8" anchor bolt ② Anchor plate ⑤ Connection bolt ③ Extension rod	
Using logger	ADL-200A smart logger	
Analyzing program	Web management program of ACE-WMP	

The readout

ACE-TCS connects to our ADL-200A Smart logger and then can be remotely controlled and measured by wireless modem

Ordering information

- Application field
- Kind of tunnel
- Circumference and point of tunnel
- Keeping readout unit



[Installation of ACE-TCS]

Ancillary equipments

- Universal terminal box (model 7012/7024)

Recommendation

- When setting the tunnel convergence monitoring system, the gage length about 1 point isn't exceeding 1.5m. If it exceeds 1.5m, the sensor error went on accumulating and then the shake of profile is big occurring, even if you put in high precision sensor.
- When installing the tunnel convergence monitoring system, you must revise the metal coefficient of linear expansion according to the temperature change. It is all right that you disregard the coefficient of sensor itself. But extension tube acts on large variable because the extension tube is stainless.

Web program



Web monitoring program as W-Pro is available graph frontier, report creation and modification, alarm, real-time measurement data retrieval. It is based on the data stored in the server computer through out all kind of static sensors.