
DATASHEET

LIQUID LEVEL SETTLEMENT SYSTEM

MODEL ESM-40S



OVERVIEW

The ESM-40S high sensitivity liquid level settlement measuring system is designed for remote measurement of minute differential settlement in tunnels, bridges and buildings, etc. with high precision. It consists of a low pressure, high sensitivity settlement sensors with digital output, connected in series to a reference reservoir and desiccant unit via fluid filled and air vent tubes respectively.

Sensors are available with digital SDI-12 or Modbus output. Maximum distance of datalogger from the most distant SDI-12 settlement sensor can be up to 200 m. A maximum of 32 sensors can be used in a chain in case the output is Modbus and maximum distance from datalogger to remotest sensor can be 1.2 km.

Data for remote online monitoring is retrieved from SDI-12 sensors by Encardio-rite model ESDL-30 SDI-12 digital datalogger. For Modbus sensors, the ESDL-30 datalogger is available with a Modbus card if specifically ordered. maximum limit of Modbus settlement sensors that can be connected to this ESDL-30 datalogger version is seven.

FEATURES

- Highly sensitive, reliable and accurate
- Suitable for remote reading of settlement
- Atmospheric pressure change does not affect reading
- Easy to install
- Easy to maintain

APPLICATION

- Differential settlement along tunnel.
- Deflection in bridges
- Settlement of buildings, floor slabs.
- Other similar applications where very small change of settlement/deflection is to be monitored with high precision.

DESCRIPTION

Model ESM-40S settlement monitoring system consists of:

- Two or more model ESM-40S/1 high precision low range settlement sensors with quick connect couplings for fluid and air vent tubes. A 'T' connector is provided at the bottom for inter-connecting signal cables. A wall mounting fixing plate is provided.
- ESM-40S/2 Reference reservoir with wall mounting accessories
- ESM-40S/3 Desiccant unit with wall mounting accessories
- ESM-40S/4 Fluid tube 8 mm o.d; air vent tube 8 mm o.d
- ESM-40S/5 Pressure gage and valve assembly.
- ESM-40S/6 Pressure vessel + air pump + accessories
- De-aerated fluid (50% water + 50% Ethylene Glycol) - 20 L
- Bus signal cable
- ESDL-30 SDI-12 Datalogger (Modbus card optionally available)

The settlement sensors are interconnected with an air vent tube terminated in a desiccant unit with a moisture trap. The common vent line being open to atmosphere results in settlement reading not being affected by local air current and changes in atmospheric pressure.

To properly fill in the de-aerated fluid in the system, it is recommended to procure the pressure vessel and air pump along with accessories.

OPERATION

The settlement sensors are mounted at locations where settlement is to be monitored. They are connected in series by a fluid filled tube to a reference sensor mounted on stable ground. In case a stable ground is not available, level of reference sensor should be checked by surveying at regular intervals. Settlement is monitored at different locations as compared to the reading obtained from the reference sensor.

All interconnected sensors including reference sensor are mounted at almost the same elevation and have a common fluid level initially. The fluid level in the reference reservoir is maintained almost constant. Settlement or heave of any sensor installed at settlement locations, causes difference in elevation between the sensor and reference reservoir, resulting in change in liquid head, which is read by the settlement transducer. Settlement results in a higher liquid head while heave results in a lower liquid head.

A reference settlement reservoir is installed near the reference sensor.

Settlement sensors have a digital SDI-12 or Modbus output and are connected in series with a single bus cable from the most distance sensor to the datalogger. The Encardio-rite ESDL-30 datalogger is mostly used with SDI-12 output and is very easy to configure. At locations covered by a mobile network, the data can be transmitted remotely to a PC at a central location.

Encardio-rite offers public cloud based web monitoring service to its customers through Drishti for retrieving data from the dataloggers, archiving the retrieved data in a SQL database, processing the data and presenting the processed data in tabular and most suitable graphical forms for easy interpretation of logged data.

SPECIFICATION

Range	1000 mm; can be calibrated to 500 mm
Sensor resolution	0.01 mm
Sensor accuracy*	Better than ± 0.4 mm
Output signal	Digital output - SDI-12 serial interface or Modbus RS-485 (6 core bus cable)
Operating Temperature range	-20 to 80°C
Protection	IP67

* As tested under lab conditions

