Thank you for purchasing SOFO® deformation sensors.
This brochure gives you basic information on how the
SOFO® sensors should be installed in the most common
types of applications. If this brochure does not cover your
type of installation please contact SMARTEC SA or your
local SOFO® Certified Solution Provider to obtain additional
information. Non-specified uses are prohibited.

SOFO® sensors are composed of two parts called the
active zone (LA and passive zone (LP). The active zone is
the part of the sensor that measures deformations and is
delimited by the two anchor pieces (AP). The passive zone
consists of intermediate part (IR) and connecting part (CP).
The intermediate part contains the optical coupler and
connects the active length to the connecting part. The
connecting part is used to optically connect the active zone
with the SOFO® reading unit or a connection box A single or
two connectors are installed at the end of the passive zone
and protected with a semitransparent tube. The metallic
piece holding the protective tube (gland nut) is also used to
couple the sensor to a connection box.

CAUTION
Do not excessively bend any part of the sensor
Anchor pieces and tubes must be aligned.
NB: Anchor piece may turn,
Avoid turning more than 180°
Do not strain the sensor to more than 1%
Do not expose the sensor to acids, fire or permanent sunshine

Standard SOFO®
Deformation Sensor
Installation and Handling
Instructions
Read Carefully Before
Using this Sensor

Via Pobiette 11
CH-6928 Manno
Switzerland
Tel: +41 91 610 18 00
Fax: +41 91 610 18 01
E-mail: smartec@smartec.ch
WWW://www.smartec.ch
GENERAL RECOMMENDATIONS

SOFO® sensors are built to withstand rough handling in typical building site conditions. There are however a few precautions that must be followed to avoid damage and ensuring good measurements.

During handling, the active, intermediate and connecting parts must not be excessively bent to prevent buckling. A sensor with a buckled zone does not work properly. In most cases, restoring the straightness of the sensor also restores its functionality. A buckling in the intermediate part can cause a permanent damage to the sensor.

Once the sensor is installed, its active zone must be relatively straight or present a smooth bending (e.g. along a vault). The anchor pieces must not form an angle to the active zone and the intermediate part.

The intermediate part must not be bent with radii below 250 mm. The connecting part must not be bent with radii below 50 mm.

The measurement fiber is pretensioned during fabrication to about 0.5% of the active length. In most cases it is therefore not necessary to further stress the sensor. On the SOFO® Sensors Test Report you will find the [DL stress] values that were measured during manufacturing. Once installed and measured, the sensors should present a value close to this one (a deviation of 1-2 mm per meter of active zone is acceptable).

The connectors should remain in the protective pipe until installation in the connection box or patch panel.

CONCRETE EMBEDDING

The SOFO® sensors can be embedded into newly poured reinforced concrete. If the sensor is installed according to the following recommendations, you can usually pour, vibrate and finish concrete without additional precautions for the sensors and obtain a survival rate of 95% or above. A failure of up to 5% of the sensors while embedding in concrete is considered as normal and does not indicate an error in the installation nor a defect of the sensors.

The active and intermediate parts must follow a rigid cable or another rigid support along their whole length. The sensor must be attached to the support using plastic or metallic rings or other fixation methods.

Do to thermal expansion of the active part tube we suggest to add a small pretension following the diagram below. Remember that this pretension is additional to DL value. The active part must be connected to the structure over its whole length using U-shaped ties. The intermediate part should be secured to the rebar each 20 cm (or less if necessary). The sensor is not designed to remain under permanent exposure to the sun nor is resistant to rodents, birds and vandalism. In case of outdoor installation we recommend to protect the sensors and cabling inside plastic or metallic ducts.

Borehole Installation

In the case of borehole installation, the sensors can be attached to a (semi-) rigid element to allow their insertion in the borehole. The injection pipe is often a good candidate as support and the sensor can be connected to it with adhesive bands.

If the sensors are installed one after the other, the anchor pieces of two successive sensors should be interlaced (the anchor piece of each sensor is slightly inside the active zone of the other). Then two anchor pieces can be connected using metallic rings. The whole multipoint sensor can be pre-assembled and delivered to the construction site coiled.

CONNECTOR CLEANING

If the connectors are not handled properly or are directly exposed to a dusty environment, they might become dirty and need cleaning. It is a good practice to clean the connectors when permanent connections are made (sensor to connection box or to extension cable) or after a long time without using the sensors.

A sign that the connectors need cleaning are small or disappearing peaks in the measurements or the apparition of parasite peaks. A high LED intensity during the scans is also an indication of a poor optical connection between the unit and the sensors.

To clean a connector proceed like this:

- Open the connector protective lid by flipping it backwards.
- Gently rub the connector front surface on a dry clean tissue.
- Stick and remove repetitively the connector front surface to a clean piece of 3M™ invisible tape or similar.
- Gently rinse the connector front surface with an adequate alcohol impregnated with alcohol + water. The tissue should not release fibers of particles.
- Close the protective lid.
- Close the protective lid.

Another way of cleaning dusty connectors is the following:

- Open the connector protective lid by flipping it backwards.
- Stick and remove repetitively the connector front surface to a clean piece of 3M™ invisible tape or similar.
- Close the protective lid.

Both techniques can be used in sequence to obtain the best results. The connector surface can be examined with an adequate microscope (available through SMARTEC SA).

Concrete Embedding

The active part must

Sensors

Concrete Embedding

Connecting Part

Surface Installation

Test Report

Borehole installation

Connector Cleaning

General recommendations

Pretension of the active part tube

Required active zone additional elongation [mm]

Maximal expected absolute temperature [°C]