

Capacitive HT-Strain Gauges

Capacitive High-Temperature Sensors for Creep and Fatigue Monitoring

The Framatome capacitive HT-Strain Gauges allow for a reliable creep and fatigue monitoring during long operational periods

Challenge

Changes in fluid temperatures and pressures result in mechanical stresses or vibrations of components and systems causing material fatigue. Creep is an issue for component operation at elevated temperatures. Strain gauges are an option for the determination of local deformations. This strain measurement allows for

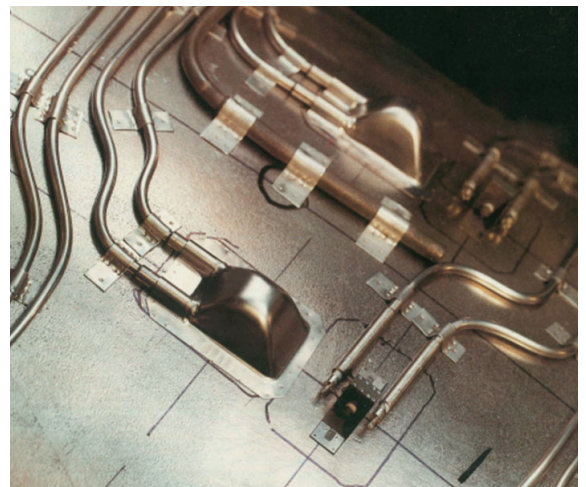
- Continuous monitoring of critical regions in order to prevent creep and fatigue crack initiation/propagation
- Optimization of component and system operation based on measured data
- Lifetime extension of components and systems based on more realistic determination of local strains as input for creep/fatigue evaluation

Solution

The capacitive high temperature strain gauges open up a huge range of applications in the measurements of local deformations. It is applicable for the quasi-static elasto-plastic strain measurement at temperatures up to 720°C (993 K). The strain gauge covers a stable measurement range up to 2,4 % strain during long periods.

Principle of a capacitive HT-Strain Gauge:

- The strain gauge transforms a change in strain change into a calibrated electric capacity signal
- The measurement signal is transmitted via the individually shielded HT-Cable to a capacity amplifier
- The HT-Cable can be delivered according to the temperature and in required lengths
- A protection cover for the HT-Strain Gauges can be delivered as protection against mechanical damage and pollution
- A capacity amplifier for the HT-Strain Gauge can be delivered



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Customer benefits

Framatome's capacitive High-Temperature Strain Gauges allow for a reliable monitoring creep and fatigue monitoring of components during long periods of time.

The capacitive HT-Strain Gauges allow:

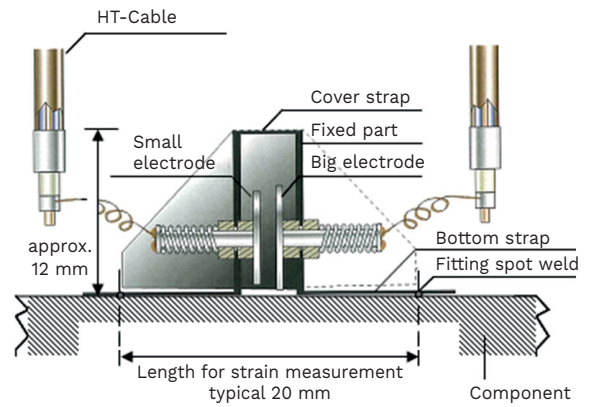
- Long term stable strain measurement ≥ 3 years at 993 K
- Quasi static elasto-plastic strain measurement
- Temperatures from 93 K up to 993 K (-180°C up to 720°C / -292°F up to 1328°F)
- Monitoring up to $70 \times 10^3 \mu\text{m/m}$

Your performance
is **our** everyday **commitment**

Technical information

Technical Data

Dimensions (approx.)	HT-Strain Gauge (28 / 12,6 / 8) Protection Cover (44 / 15 / 32) (mm, w / h / d)
Temperature range	max. 720°C / 993 K / 1328°F
Humidity (relative)	max. 80%, non condensing
Measurement principle	Strain (change of capacity)
Measurement range (Strain)	24.000 $\mu\text{m} / \text{m}$
Extended Pulling Measurement range (limited accurateness)	50.000 $\mu\text{m} / \text{m}$
Resolution	approx. 5 $\mu\text{m} / \text{m}$
Long term drift	≤ 100 [$\mu\text{m} / \text{m}$] / year (650°C / 923 K / 1202 F)
Temperature drift	$\leq 0,5$ [$\mu\text{m} / \text{m}$] / K
Temperature influence of the Sensibility	0,2% / 100 K
Measurement difference after a temperature Cycle	≤ 20 $\mu\text{m} / \text{m}$
Capacity	0,5 ... 1,3 pF
Options	- Sensor protection covers available - HT-cable in different length available - Capacitive amplifier (measurement bridge) "KaMes" available



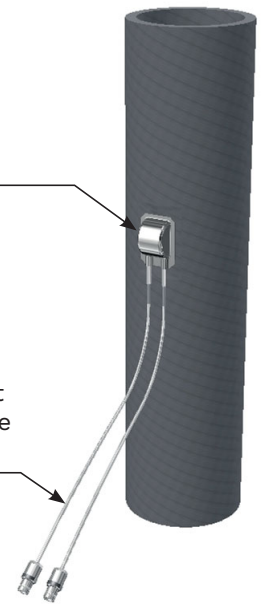
Different length of cables are available.

Protection Cover

Protection against
mechanical damages
and pollution

HT-Cable

Individual shielded
temperature-resistant
cable with BNC female
connector



Different length of cables are available.

Key figures

720°C maximum temperature rang

≤ 100 [$\mu\text{m} / \text{m}$] K Long term drift

Contact: monitoring-and-diagnostics@framatom.com
www.framatome.com

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