

# NAGANO KEIKI CO., LTD.

## 1. The Challenge of Micromachine Technology

Pressure measurements designed to meet the needs of various industries are important basic technologies in any age. Nagano Keiki became involved in this technology as a general manufacturer of pressure measurement and control equipment by developing pressure sensors using micromachine technology.

## 2. Development of Micromachine Technology

To date, Nagano Keiki has developed high-temperature semiconductor pressure sensors using epitaxial aluminum deposition through a commission by the Japan Science and Technology Corporation, integrated capacitance type pressure sensors through joint research with Tohoku University, and a high-precision wet etching technology.

There are currently two types of pressure sensors manufactured with our micromachining technology: a capacitive type and a SOI (silicon on insulator) strain gauge type.

Nagano Keiki mass-produces a series of highly sensitive, highly durable pressure capacitive sensors ranging from the micro-pressure of 25 Pa. In addition to satisfying customer demands for sensors, we produce other products that make use of high-sensitivity and high-durability features, such as differential pressure detecting leakage testers and medical equipment that detects the behavior of infants and issues an alert for abnormal breathing and the like.

Compared to diffusion type sensors, sensors using



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an SOI strain gauge are superior in heat resistance and with stand voltage and demonstrate high reliability in severe environments.

## 3. Future Challenges

We have recently begun developing sensors for microspaces designed to measure the physical properties (pressure, temperature, etc.) of micro chemical plants formed on a glass substrate and analyzing devices that fit in the palm of one's hand called  $\mu$ -TAS (micro-Total Analysis System).

In addition to improved sensitivity and precision, there will be future demand to further reduce the size and cost of sensors with increased performance. We would like to increase the scope of nano and micromachine technologies and aim toward creating durable products.



**Fig. 1 Applied products**



**Fig. 2 Pressure sensor device**