TRANSDUCER-SPECIFIC STRAIN GAUGES

TML gauges are not only used for strain measurement, but also as sensors for strain gauge-type transducers. Strain gauge-type transducers convert various types of physical quantities to mechanical strain in the stress-generating body (elastic body) and use strain gauges to convert mechanical strain to electric output. Strain gauge-type transducers are generally categorized into the following types.

- Force transducers (Load cell)
- Pressure transducers
- Acceleration transducers
- Displacement transducers
- Torque transducers

VARIOUS TYPE OF TML TRANSDUCER-SPECIFIC STRAIN GAUGES

GAUGE SHAPE AND GAUGE LENGTH

Single, Rectangular 2-element, Torque (Shearing) strain measurement

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Gauge length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-element</td>
<td>2, 3</td>
</tr>
<tr>
<td>90° 2-element</td>
<td>2, 3, 6</td>
</tr>
<tr>
<td>Torque (Shearing strain)</td>
<td>2</td>
</tr>
</tbody>
</table>

Pattern

- Single-element
- Torque

(LA) (CT)

90° 2-element

(CB) (CM)

2 types of 90° 2-element gauge are lined-up with different pattern of gauge tab. CM-type has half-bridge configuration.

GAUGE RESISTANCE

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Gauge resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-element</td>
<td>350, 1000</td>
</tr>
<tr>
<td>90° 2-element</td>
<td>120, 350</td>
</tr>
<tr>
<td>Torque (Shearing strain)</td>
<td>350</td>
</tr>
</tbody>
</table>

*1000-ohm gauge has less power consumption in bridge circuit comparing to 350-ohm gauge’s and limits Joule’s heat generation.

GAUGE BACKING MATERIALS

Unlike stress measurement gauges, the gauge backing materials for transducer-specific strain gauge cannot be determined solely on the operational temperature and bonding method. To ensure maximum transducer performance, it is necessary to test various combinations using different stress-generating bodies (elastic bodies) to select the most suitable backing materials.

Operational temperature

Operational temperature range differs from heat-resistant temperature’s.

F series gauge (with epoxy backing) is also available for use of heat-curing type bonding adhesives. Refer to page 61-62 for the details.

<table>
<thead>
<tr>
<th>Gauge series</th>
<th>Gauge base materials</th>
<th>Operational temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Epoxy resin</td>
<td>−20 ~ +80°C</td>
</tr>
<tr>
<td>QF</td>
<td>Polyimide resin</td>
<td>−20 ~ +200°C</td>
</tr>
<tr>
<td>EF</td>
<td>Polyimide resin</td>
<td>−20 ~ +200°C</td>
</tr>
</tbody>
</table>

OPERATIONAL TEMPERATURE RANGE

Operational temperature differs from heat-resistant temperature. F series gauge having epoxy resin is available with heat-curing type bonding adhesive.

CREEP ADJUSTMENT

The creep characteristic is particularly important in force transducers. The most common compensation system uses the material creep (+) of the stress-generating body (elastic body) and the gauge creep (−) to cancel each other. Various TML strain gauges are available for creep adjustment and are selectable by creep code.

Creep code

Gauge creep Large → Small

Creep code C2 > C4 > C6 > C8

TEMPERATURE SENSITIVITY COMPENSATION

Elasticity modulus of strain-generating body (elastic body) varies with temperature variation. In the same manner, as ambient temperature around the strain-generating body varies, resulting in change of apparent strain. To reduce such temperature influence, sensitivity compensation resistor is assembled in bridge circuit.

Coding system of Transducer-specific strain gauges

F LA - 2 - 350 - C2 - 11

Gauge length Creep code

- 11 Mild steel
- 17 Stainless steel
- 23 Aluminum

Tokyo Sokki Kenkyujo

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In addition to those shown above, various other gauges for transducers are available.

Detailed specifications must be discussed and decided before ordering gauges for transducers. Consult a sales representative.