Kyowa’s strain-gage acceleration transducers convert the acceleration of running vehicle or the vibration of car body or machinery into minute voltage to enable accurate measurement of acceleration or vibration with various measuring instruments. Each model is compact and lightweight, and ensures superior static and dynamic characteristics. Various rated capacity models cover a wide scope of applications. In addition, triaxial models are available for simultaneous detection of accelerations in three directions: X, Y and Z.

**Features**

- Compact and lightweight design results in minimal effects on the vibration mode of the measuring objects to which the transducer is mounted.
- Wide frequency response range enables faithful detection of impact-initiated acceleration.
- Fatigue life is 10 million times or more.

**Principle of Acceleration Transducers**

With the basic configuration shown below, acceleration initiates inertia force to the weight and deforms the leaf spring. The strain gage adhered to the leaf spring detects the displacement of the leaf spring as a strain quantity proportional to the acceleration. The strain-gage signal is amplified to enable acceleration measurement. An advantageous feature of this configuration is to enable the transducer to respond to static acceleration at DC.

**Installation and Removal**

Install the acceleration transducer aligning the sensitive axis (+←→− marked on the transducer) with the acceleration measuring direction.

**There are 2 marks which indicates the sensitivity axis of acceleration.**

1. When the arrow which indicates the sensitivity axis is “+←→−”;
   - In case a acceleration transducers is set as “+” points the earth’s center (Direction for Acceleration of Gravity), +1 G is output when any load is not added. As the output is based on Acceleration of Gravity, the relationship between input condition and output of acceleration is shown on the following table.

<table>
<thead>
<tr>
<th>Acceleration conditions</th>
<th>Acceleration</th>
<th>Impact</th>
<th>Rotation</th>
<th>Center of rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
<td></td>
</tr>
<tr>
<td>Acceleration of Gravity</td>
<td>+1 G</td>
<td>1 G</td>
<td>1 G</td>
<td></td>
</tr>
<tr>
<td>Gravitational acceleration</td>
<td>1 G at the time of stillness</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. When the arrow which indicates the sensitivity axis is “↑”;
   - Arrows on the case “↑” in accordance with the direction of acceleration.

<table>
<thead>
<tr>
<th>Acceleration conditions</th>
<th>Acceleration</th>
<th>Impact</th>
<th>Rotation</th>
</tr>
</thead>
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<tr>
<td></td>
<td>(+)</td>
<td>(+)</td>
<td>(+)</td>
</tr>
<tr>
<td>The arrow on the case is in accordance with the direction of acceleration.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Please check instruction Acceleration transducers are installed to objects by adhesives like CC-33A, bolts, or mount bases. To measure correctly, mount acceleration transducers following instruction manual. When removing acceleration transducers, take sufficiently care to avoid excessive impact or force resulting in damaging transducers.
Temperature Effect on Frequency Response

To ensure flat frequency response characteristics, some models of acceleration transducers have oil sealed inside. The viscosity of the oil is adjusted to make the frequency response flat at 23°C. Changes in viscosity due to temperature changes affect the frequency response and phase characteristics. Though a silicone oil which the viscosity hardly changes is adopted, the frequency response characteristics of the transducer are affected by temperatures as shown in the figure below. Thus, for accurate measurement in a frequency zone exceeding one-tenth the stated frequency response range, the temperature of the transducer should be kept around 23°C.

Overload Considerations

Generally, the magnitude of acceleration is difficult to be grasped by human perception. If the transducer is dropped on the floor, it may easily sense acceleration exceeding 9807 m/s² (1000 G) depending on the material of the floor. If a small-capacity acceleration transducer receives an acceleration 10 times larger than the rated capacity, the initial voltage unbalance changes outstandingly, thereby making the transducer unusable due to disconnection of the gage, etc. Thus, the acceleration transducer must be handled carefully.

We assume 1 G = 9.807 m/s² in this catalog.
Vibration tests on railway vehicle and truck

Small-sized Triaxial Acceleration Transducer AS-TG

Universal Recorder EDX-200A

Drop impact tests of fuel cell container and lithium-ion battery

Small-sized High Frequency Response Acceleration Transducer ASH-A

Memory Recorder/Analyzer EDX-5000A

Vibration tests on various structures such as piers

Small-sized Triaxial Acceleration Transducer AS-TG

Memory Recorder/Analyzer EDX-5000A