

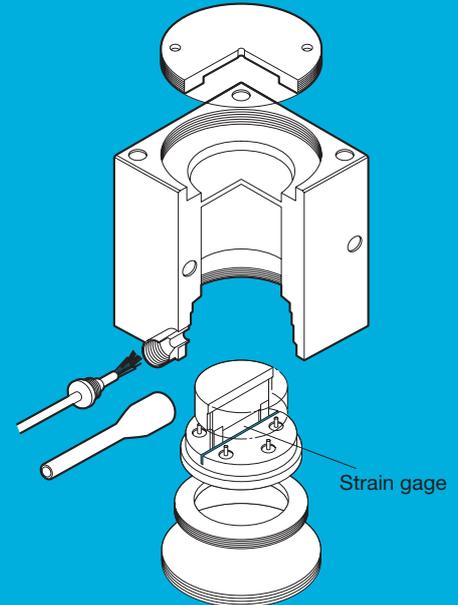
Acceleration Transducers

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 capacities 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

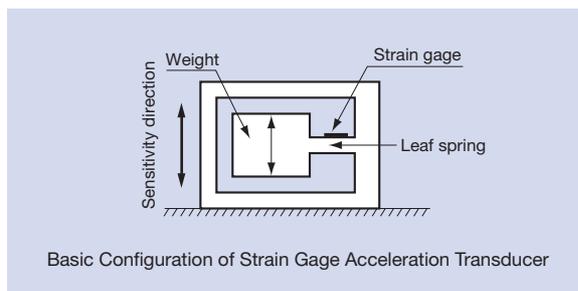
- Compact and lightweight design results in minimal effects on the vibration mode of the measuring objects to which the transducer is mounted.
- Wide frequency response range enables faithful detection of impact-initiated acceleration.
- Fatigue life is 10 million times or more.

Acceleration Transducers



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.

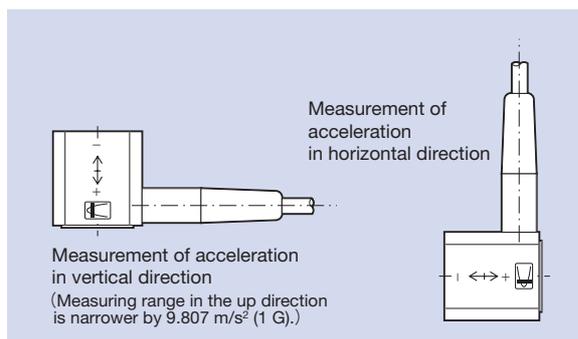


When acceleration transducers are installed to direct "+" direction to the center of the earth aligning to the direction of gravity acceleration, the output is + 1G in static position. Because KYOWA acceleration transducers adopt the gravity acceleration as the standard output, relationships between input condition of acceleration and polarity of output are shown.

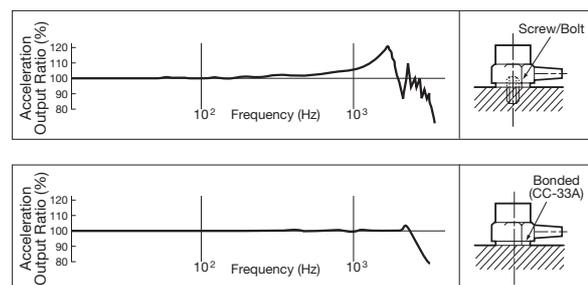
	Acceleration	Impact	Rotation	At geostationary, output signal is 1G Gravitational acceleration is to be basic
Acceleration condition				
Polarity of output	(+)	(-)	(+)	

Installation and Removal

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



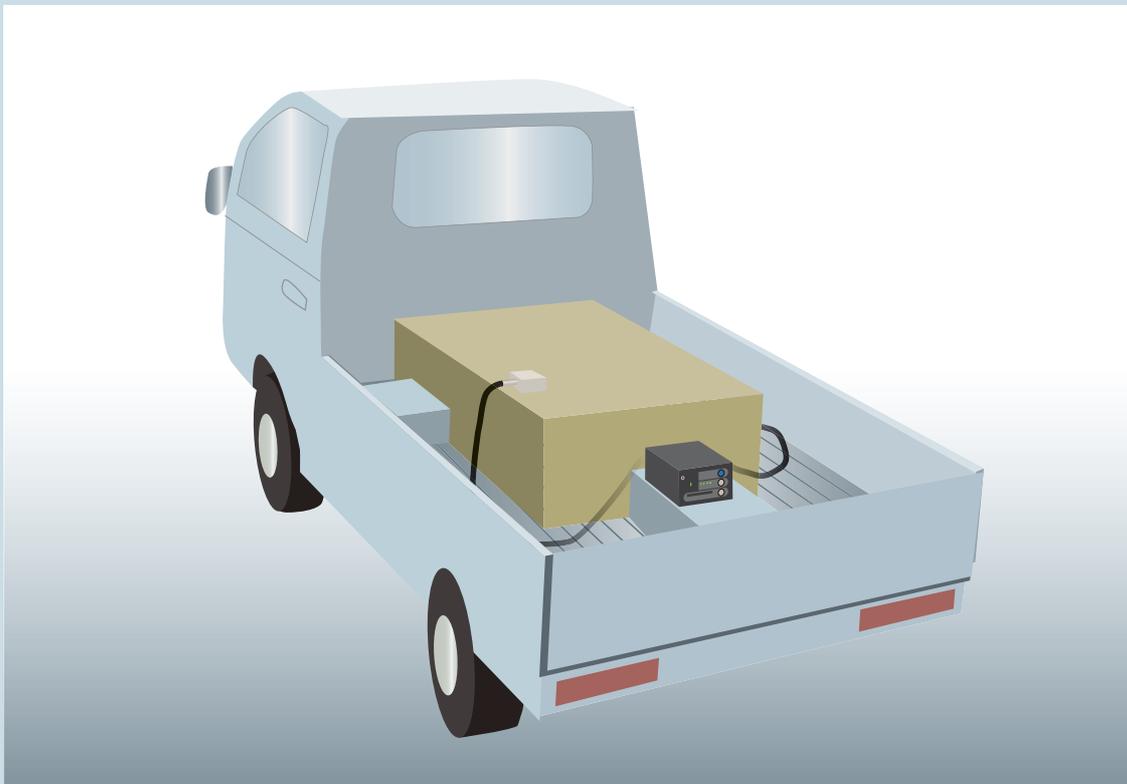
There are many products which sensitivity axis is marked in "↑ : one side direction arrow". Please check instruction Acceleration transducers are installed to objects by adhesives like CC-33A, bolts, or mount bases. To measure correctly, mount acceleration transducers following instruction manual. When removing acceleration transducers, take sufficiently care to avoid excessive impact or force resulting in damaging transducers.





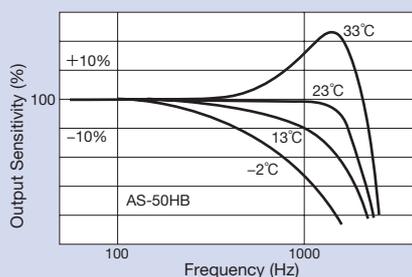
Acceleration Transducers Measurement Example

- Vibration tests of goods during truck transportation



Temperature Effect

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.

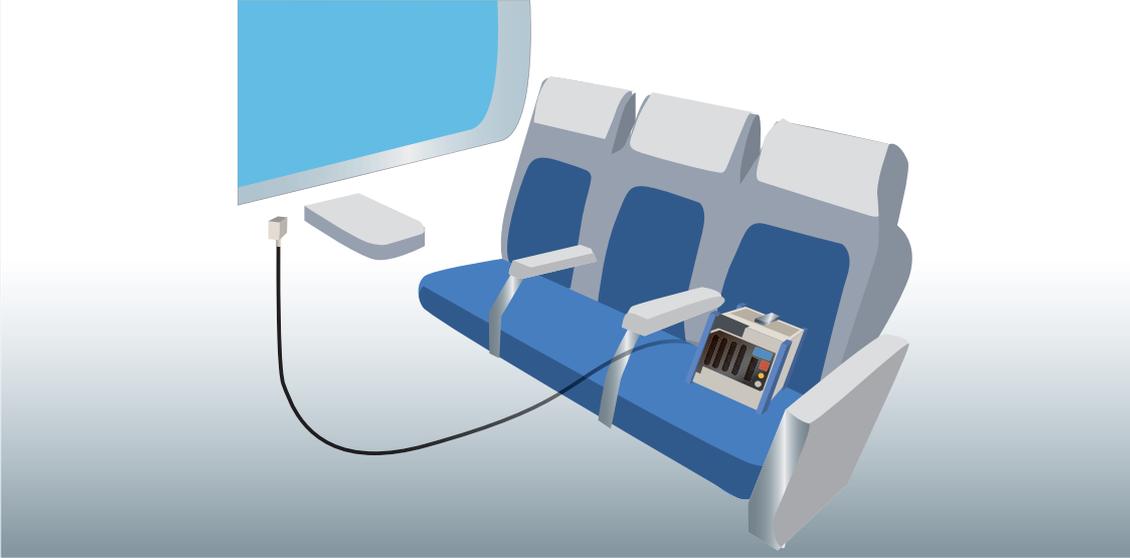


Overload Considerations

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/s^2 (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.



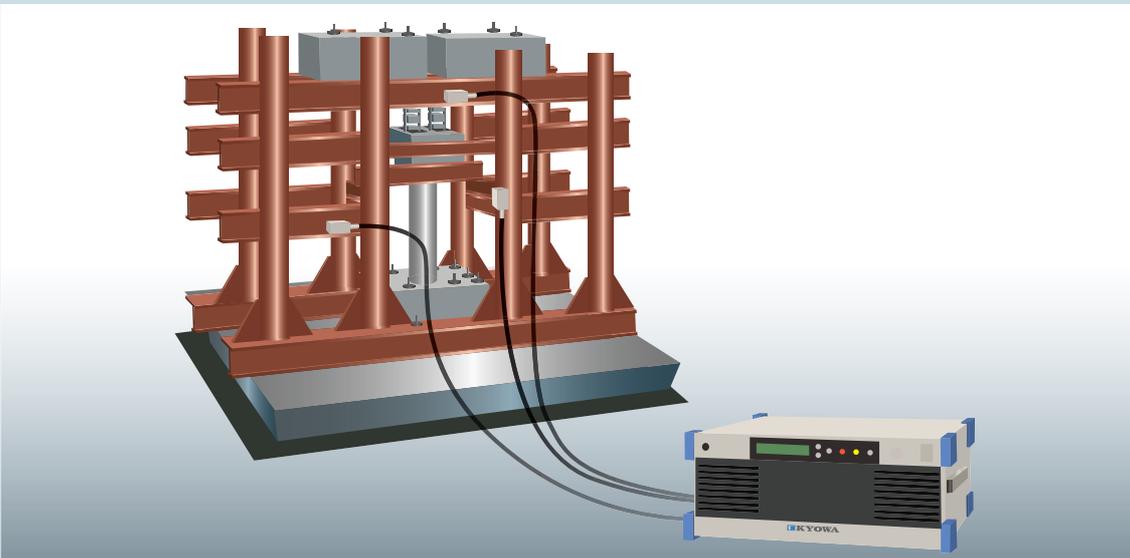
- Vibration tests on railway vehicle and truck



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



- Vibration tests on various structures such as piers



Acceleration Transducer Selection Chart

Model		Rated Capacity ($\pm m/s^2$)										Ref. Page
		9.807	19.61	49.03	98.07	196.1	490.3	980.7	1961	4903	9807	
Small-sized Small capacity	Small-sized Small/ Medium capacity AS-GA 	●	●	●	●	●						2-113
	Small-sized Small/ Medium capacity AS-GB 	●	●	●	●	●						2-113
Small-sized Triaxial	Small-sized Small/ Medium capacity AS-TG 	●	●	●	●	●						2-117
Water Proof	Small-sized Small/ Medium capacity ASW-A 	●	●	●	●	●						2-119
Small-sized	Small-sized Small capacity AS-B 				●	●	●					2-114
High Frequency response	Medium capacity AS-HB 				●	●	●					2-115
High Frequency response	Large capacity NEW ASH-A 							●	●	●	●	2-116
Triaxial	Medium capacity AS-TB 				●	●	●					2-118
Triaxial	Large capacity AS-TA 							●	●	●	●	2-118



AS-GA,GB

Small-Sized, Small-Capacity Acceleration Transducers



ACCELERATION TRANSDUCERS

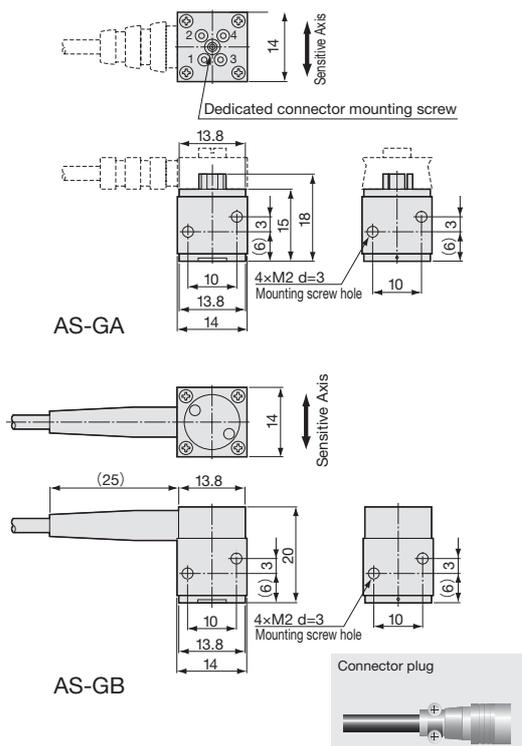


※AS-GB is available in TEDS-installed version. Inquiries are welcome.

Easy to Use, Small, Lightweight, and Suitable for Measurement of Vibrations not only of Model Structures but also in the field of human engineering.

Using a strain gage as the sensing element, AS-GA and AS-GB series acceleration transducers are designed to measure small levels of acceleration. The miniature lightweight design makes them widely used for measurement of vibrations in small structures or scale models as well as in the field of human engineering. AS-GA series comes with hermetic terminal and AS-GB series are integrated with cable. A convenient mount base to facilitate installation.

Dimensions



- Compact & Lightweight
- 9.807 to 196.1 m/s²

Specifications

Performance

Rated Capacity	: See table below.
Nonlinearity	: Within±1% RO
Hysteresis	: Within±1% RO
Rated Output	: 0.5 mV/V (1000μm/m) or more

Environmental Characteristics

Safe Temperature Range	: -15 to 65°C
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Electrical Characteristics

Safe Excitation Voltage	: 6V AC or DC
Recommended Excitation Voltage	: 1 to 3V AC or DC
Input Resistance	: 121Ω±1.7%
Output Resistance	: 121Ω±1.7%
Cable : 4-conductor (0.08 mm ²) vinyl shielded cable, 3.2 mm diameter	
by 5 m long, terminated with connector plug; and with dedicated removable connector at the other end (AS-GA)	
(AS-GA : Shield wire is not connected to mainframe.)	
(AS-GB : Shield wire is connected to mainframe.)	

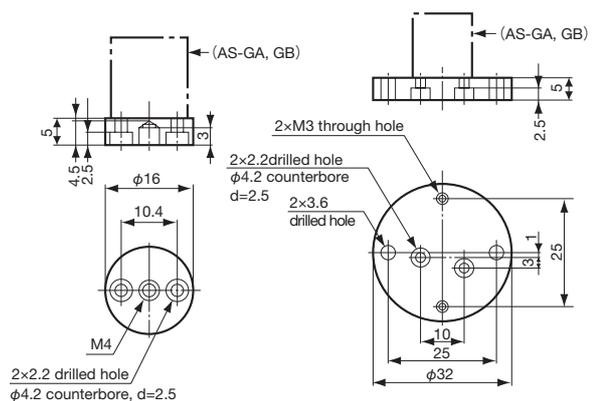
Mechanical Properties

Safe Overload Rating	: 300%
Frequency Response Range	: See table below.
Transverse Sensitivity	: ±4%
Weight	: Approx. 15 g (AS-GA) Approx. 25 g (AS-GB)

Model	Rated Capacity (Reference Value)	Frequency Response (at 23°C)
AS-1GA, GB	±9.807m/s ² (±1G)	DC~40Hz ±5%
AS-2GA, GB	±19.61m/s ² (±2G)	DC~60Hz ±5%
AS-5GA, GB	±49.03m/s ² (±5G)	DC~100Hz ±5%
AS-10GA, GB	±98.07m/s ² (±10G)	DC~150Hz ±5%
AS-20GA, GB	±196.1m/s ² (±20G)	DC~250Hz ±5%

- Notes: 1. Percentage in frequency response column is sensitivity deviation.
2. Resonance frequency measured by mounting to a shaker.
3. To install AS-GB, use CC-33A adhesive or optional mount base (see figures below).

Mount Base



Weight: Approx.2.5g,
aluminum DK-1A

Weight: Approx.10g,
aluminum DK-1B

AS-B

Small-Sized Acceleration Transducers



※TEDS-installed versions can be manufactured. Inquiries are welcome.

The Small and Lightweight Design Barely Disturbs the Vibration Mode of the Object Under Measurement.

- 10 million times repetitive measurement possible

The small and lightweight design barely disturbs the vibration mode of the object under measurement. Easy installation is ensured using CC-33A adhesive.

- Compact & Lightweight
- 98.07 to 490.3 m/s²

Specifications

Performance

Rated Capacity	: See table below.
Nonlinearity	: Within±1% RO
Hysteresis	: Within±1% RO
Rated Output	: 0.5 mV/V (1000μm/m) ±20%(±25% with AS-10B)

Environmental Characteristics

Safe Temperature Range	: -10 to 60°C
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Electrical Characteristics

Safe Excitation Voltage	: 6V AC or DC
Recommended Excitation Voltage	: 1 to 3V AC or DC
Input Resistance	: 120Ω±5%
Output Resistance	: 120Ω±5%
Cable	: 4-conductor (0.08 mm ²) vinyl shielded cable, 3.2 mm diameter by 5 m long, terminated with connector plug (Shield wire is connected to mainframe.)

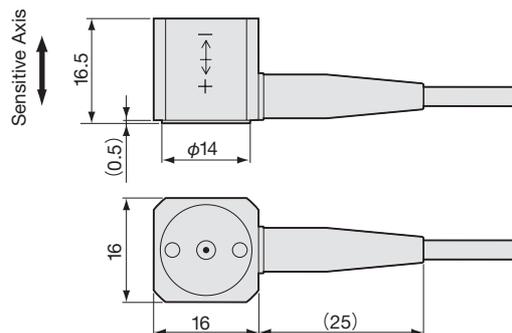
Mechanical Properties

Safe Overload Rating	: 300%
Frequency Response Range	: See table below.
Transverse Sensitivity	: ±2%
Weight	: Approx. 13 g

Model	Rated Capacity (Reference Value)	Frequency Response (at 23°C)
AS-10B	±98.07m/s ² (±10G)	DC~350Hz ±5%
AS-20B	±196.1m/s ² (±20G)	DC~500Hz ±5%
AS-50B	±490.3m/s ² (±50G)	DC~1kHz ±5%

Notes: 1. Percentage in frequency response column is sensitivity deviation.
2. Resonance frequency measured by mounting to a shaker.

■ Dimensions



AS-HB

Small-Sized, High Frequency Response Acceleration Transducers



ACCELERATION TRANSDUCERS



※TEDS-installed versions can be manufactured. Inquiries are welcome.

Highly Accurate and Reliable Transducers with Wide Frequency Response Ranges

AS-HB series acceleration transducers provide twice wider frequency response range than AS-B series at maximum. Therefore, AS-HB series ensure more accurate acceleration measurements. It is easy to install AS-HB acceleration.

- High Frequency Response
- 98.07 to 490.3 m/s²

Specifications

Performance

Rated Capacity :	See table below.
Nonlinearity :	Within±1% RO
Hysteresis :	Within±1% RO
Rated Output :	0.5mV/V (1000μm/m) ±20%(±25% with AS-10HB)

Environmental Characteristics

Safe Temperature Range :	-15 to 65°C
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Electrical Characteristics

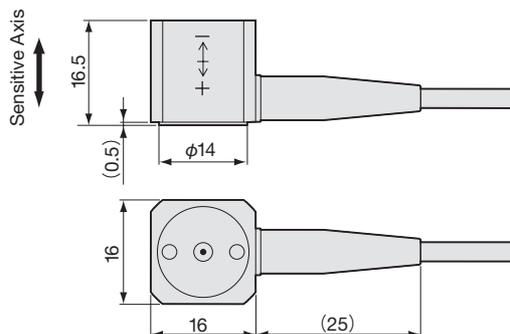
Safe Excitation Voltage :	6V AC or DC
Recommended Excitation Voltage :	1 to 3V AC or DC
Input Resistance :	120Ω±8.3%
Output Resistance :	140Ω±7.1%
Cable :	4-conductor (0.08 mm ²) vinyl shielded cable, 3.2 mm diameter by 5 m long, terminated with connector plug (Shield wire is connected to mainframe.)

Mechanical Properties

Safe Overload Rating :	300%
Frequency Response Range :	See table below.
Transverse Sensitivity :	±2%
Weight :	Approx. 13g

Model	Rated Capacity (Reference Value)	Frequency Response (at 23°C)
AS-10HB	±98.07m/s ² (±10G)	DC~500Hz ±5%
AS-20HB	±196.1m/s ² (±20G)	DC~650Hz ±5%
AS-50HB	±490.3m/s ² (±50G)	DC~1.5kHz ±5%

Dimensions



ASH-A

Small-Sized, High Frequency Response Acceleration Transducers



※TEDS-installed versions can be manufactured. Inquiries are welcome.

- High Frequency Response
- 980.7 to 9807 m/s²

Specifications

Performance

Rated Capacity :	See table below.
Nonlinearity :	Within ±1% RO
Hysteresis :	Within ±1% RO
Rated Output :	0.5 mV/V (1000 μm/m) ±20%

Environmental Characteristics

Safe Temperature Range :	-15 to 65°C
Compensated Temperature Range :	5~40°C
Temperature Effect on Zero Balance :	Within ±1%RO/°C
Temperature Effect on Output :	Within ±1%/°C

Electrical Characteristics

Safe Excitation Voltage :	6V AC or DC
Recommended Excitation Voltage :	1 to 3V AC or DC
Input Resistance :	120Ω±8.3%
Output Resistance :	120Ω±8.3%
Cable :	4-conductor (0.08 mm ²) vinyl shielded cable, 3.2 mm diameter by 5 m long, terminated with connector plug (Shield wire is connected to mainframe.)

Mechanical Properties

Safe Overload Rating :	300%
Frequency Response Range :	See table below.
Transverse Sensitivity :	less than ±2%
Weight :	Approx. 6.5 g

Compact and Lightweight Design Resulting in Slight Effects on Vibration Mode

Compact and lightweight design of ASH-A series acceleration transducers do not disturb vibration mode of objects by installing these transducers. In addition, it is easy to install ASH-A acceleration transducers by adhesives like CC-33A.

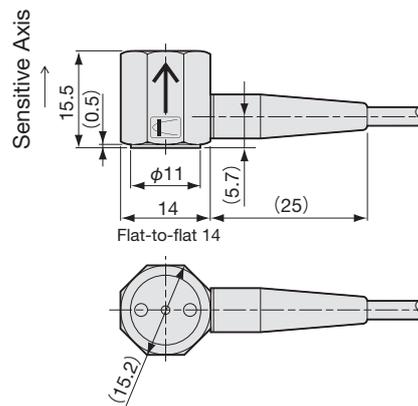
Model	Rated Capacity (Reference Value)	Frequency Response (at 23°C)
ASH-A-100	±980.7m/s ² (±100G)	DC~2kHz ±5%
ASH-A-200	±1961m/s ² (±200G)	DC~3.5kHz ±5%
ASH-A-500	±4903m/s ² (±500G)	DC~5kHz ±10%
ASH-A-1K	±9807m/s ² (±1000G)	DC~7kHz ±10%

Acceleration Direction

[↑] (Arrow head to one side direction mark of mainframe)

Acceleration condition	Acceleration	impact	rotation	The mark of mainframe corresponds to the direction of acceleration
Polarity of output	(+)	(+)	(+)	

Dimensions



AS-TG

Small-Sized Triaxial Acceleration Transducers



※TEDS-installed versions can be manufactured. Inquiries are welcome.

- 9.807 to 196.1 m/s²
- Simultaneous Measurement of Acceleration in X, Y and Z Directions

Specifications

Performance

Rated Capacity :	See table below.
Nonlinearity :	Within±1% RO
Hysteresis :	Within±1% RO
Rated Output :	0.5 mV/V (1000μm/m) or more

Environmental Characteristics

Safe Temperature Range :	-10 to 60°C
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Electrical Characteristics

Safe Excitation Voltage :	6V AC or DC
Recommended Excitation Voltage :	1 to 3V AC or DC
Input Resistance :	121Ω±1.7%
Output Resistance :	121Ω±1.7%
Cable :	4-conductor (0.08 mm ²) vinyl shielded cable, 3.2 mm diameter by 5 m long, terminated with connector plug (Shield wire is not connected to mainframe.)

Mechanical Properties

Safe Overload Rating :	1000% (with stopper)
Frequency Response Range :	See table below.
Transverse Sensitivity :	±4%
Weight :	Approx. 110 g

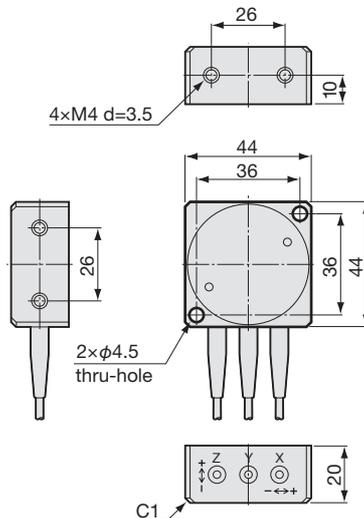
Able to Withstand against 10 Times Larger Overload than Rated Capacity by Built-in Overload Stopper

AS-TG series acceleration transducers have 3 incorporated miniature acceleration transducers to measure simultaneously 3 axial accelerations (front-rear, left-right, and up-down directions). Not only are interferences of AS-TG series among each axes little, but also AS-TG series can withstand against 10 times larger overload than rated capacity. In addition, 100.

Model	Rated Capacity (Reference Value)	Frequency Response (at 23°C)
AS- 1TG	±9.807m/s ² (±1G)	DC~40Hz ±5%
AS- 2TG	±19.61m/s ² (±2G)	DC~60Hz ±5%
AS- 5TG	±49.03m/s ² (±5G)	DC~100Hz ±5%
AS-10TG	±98.07m/s ² (±10G)	DC~150Hz ±5%
AS-20TG	±196.1m/s ² (±20G)	DC~250Hz ±5%

Notes: Measurement range of up-down direction is narrowed by 1G (9.807 m/s²) because gravity acceleration is always applied to acceleration transducers. In terms of AS-1TG, detected value exceeds rated capacity in positive side toward gravity direction. Although AS-TG acceleration transducers are not broked under safe overload rating, characteristics are out of warranty.

Dimensions



AS-TA, TB

Triaxial Acceleration Transducers



※ TEDS-installed versions can be manufactured. Inquiries are welcome.

- Simultaneous Measurement of Acceleration in X, Y and Z Directions
- 98.07 to 9807 m/s²

Specifications

Performance

Rated Capacity :	See table below.
Nonlinearity :	Within±1% RO
Hysteresis :	Within±1% RO
Rated Output :	±0.5 mV/V (1000μm/m) or more (AS-TA) ±0.5 mV/V (1000μm/m) ±20% (AS-TB) (±25% with AS-10TB)

Environmental Characteristics

Safe Temperature Range :	-15 to 65°C
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Electrical Characteristics

Safe Excitation Voltage :	6V AC or DC
Recommended Excitation Voltage :	1 to 3V AC or DC
Input Resistance :	120Ω±5%
Output Resistance :	120Ω±5%
Cable :	4-conductor (0.08 mm ²) vinyl shielded cable, 3.2 mm diameter by 5 m long, terminated with connector plug (Shield wire is connected to mainframe.)

Mechanical Properties

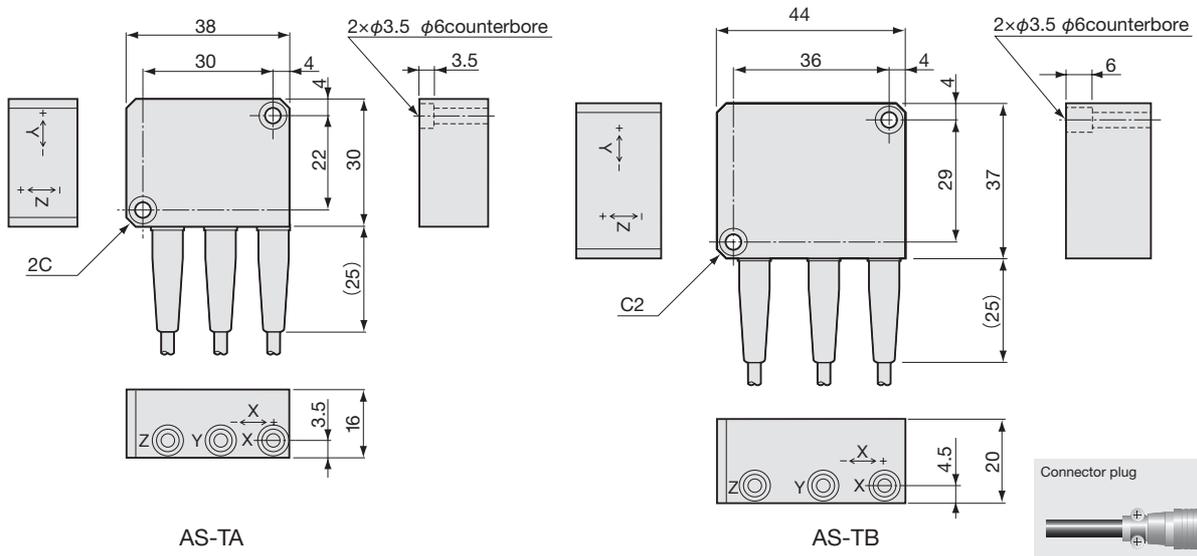
Safe Overload Rating :	300% (each axis)
Frequency Response Range :	See table below.
Transverse Sensitivity :	±2%
Weight :	Approx. 45 g (AS-TA), Approx. 95 g (AS-TB)

Compact and Lightweight Design and Simultaneous Measurement of Accelerations in X, Y, and Z Directions

AS-TA and AS-TB series acceleration transducers have 3 incorporated miniature acceleration transducers to measure simultaneously 3 axial accelerations (front-rear, left-right, and up-down directions). Because of little interference among each axes, these series acceleration transducers enable accurate measurement and be applied to acceleration analysis of complex vibration phenomenon.

Model	Rated Capacity (Reference Value)	Frequency Response (at 23°C)
AS-10TB	±98.07m/s ² (±10G)	DC~350Hz ±5%
AS-20TB	±196.1m/s ² (±20G)	DC~500Hz ±5%
AS-50TB	±490.3m/s ² (±50G)	DC~1kHz ±5%
AS-100TA	±980.7m/s ² (±100G)	DC~1.2kHz ±5%
AS-200TA	±1961m/s ² (±200G)	DC~2.1kHz ±5%
AS-500TA	±4903m/s ² (±500G)	DC~3kHz ±10%
AS-1000TA	±9807m/s ² (±1000G)	DC~5kHz ±10%

Dimensions



ASW-A

Waterproof Acceleration Transducers



ACCELERATION TRANSDUCERS



※TEDS-installed versions can be manufactured. Inquiries are welcome.

Waterproof Structure to Withstand against Water Pressures up to 90kPa. Corrosion-Resistant Model with Stainless Steel

ASW -A series are waterproof acceleration transducers to withstand against water pressures up to 490kPa. Even small-sized these acceleration transducers ensure reliable measurements under harsh operating environments. In addition, corrosion-resistant version with stainless steel case is also available.

- Usable Underwater or underground
- 9.807 to 196.1 m/s²

Specifications

Performance

Rated Capacity :	See table below.
Nonlinearity :	Within±1% RO
Hysteresis :	Within±1% RO
Rated Output :	±0.5 mV/V (1000μm/m) or more

Environmental Characteristics

Safe Temperature Range :	-15 to 65°C
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Electrical Characteristics

Safe Excitation Voltage :	6V AC or DC
Recommended Excitation Voltage :	1 to 3V AC or DC
Input Resistance :	122Ω±1.6%
Output Resistance :	122Ω±1.6%
Cable :	4-conductor (0.08 mm ²) chloroprene shielded cable, 4 mm diameter by 5 m long, terminated with connector plug Underwater application possible through use of KYOWA cable connection kit JB-200A (Shield wire is connected to mainframe.)

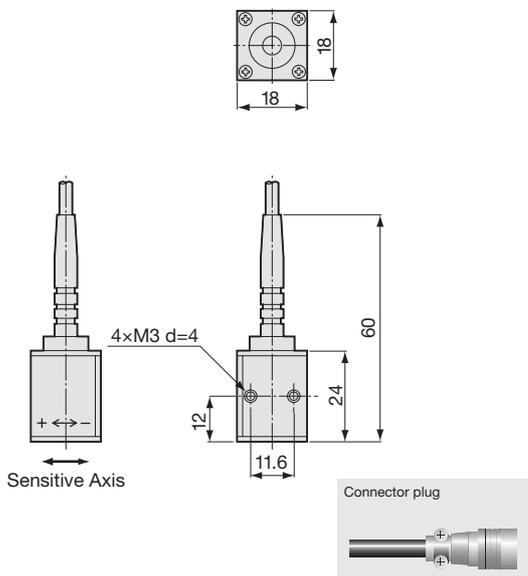
Mechanical Properties

Safe Overload Rating :	300%
Frequency Response Range :	See table below.
Transverse Sensitivity :	±4%
Withstand Water Pressure :	490.3 kPa
Material :	Case : Corrosion-resistant aluminum, anodic acid coating
Weight :	Approx. 40 g

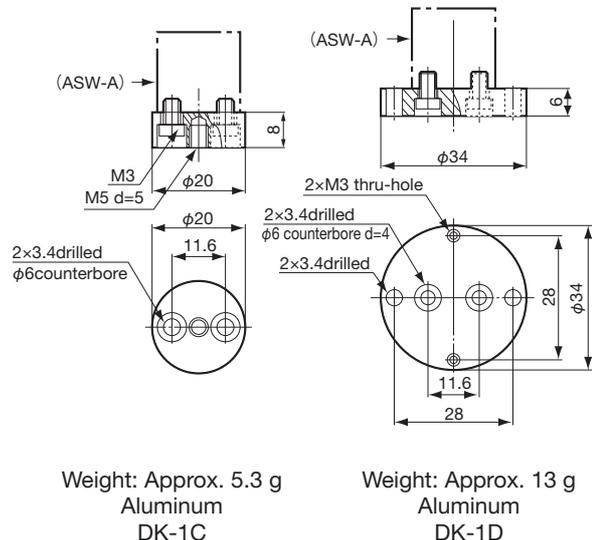
※For installation, use CC-33A adhesive or optional mount base (shown below).

Model	Rated Capacity (Reference Value)	Frequency Response (at 23°C)
ASW- 1A	±9.807m/s ² (±1G)	DC~40Hz ±5%
ASW- 2A	±19.61m/s ² (±2G)	DC~60Hz ±5%
ASW- 5A	±49.03m/s ² (±5G)	DC~100Hz ±5%
ASW-10A	±98.07m/s ² (±10G)	DC~150Hz ±5%
ASW-20A	±196.1m/s ² (±20G)	DC~250Hz ±5%

Dimensions



Mount Base



Weight: Approx. 5.3 g
Aluminum
DK-1C

Weight: Approx. 13 g
Aluminum
DK-1D

