

ANALOG • DIGITAL • SMART

# ASC accelerometers for **maximum safety**



ENTRY LEVEL (< 25  $\mu\text{g}$ )



ASC ECO series



ASC ECO CS series

HIGH LEVEL (< 10  $\mu\text{g}$ )



ASC CS series



ASC OS series

PREMIUM LEVEL (< 1  $\mu\text{g}$ )



ASC EQ



ASC QBA

SUCCESSFUL WORLDWIDE. AT HOME IN GERMANY.

# A customized solution for every project

Bridges are exposed to enormous loads. Their stress levels due to increasing traffic volumes, ageing processes and environmental impact are constantly growing. **Continuous structural monitoring** is becoming the state-of-the-art approach to ensuring operational safety. ASC manufactures and delivers a wide range of sensor solutions to realize a variety of structural health monitoring systems. We know that no two applications are the same. Since the condition and load profile of each structure are unique, our sensor solutions, too, are tailored to individual requirements.

To achieve this, over the years we have developed comprehensive sensor technology solutions: **analog – digital – smart.**

**High-precision accelerators from ASC** play a critical role in bridge monitoring. They are extremely robust and stable.

In three essential performance categories, therefore, they are now in use on many bridges in Germany and around the world.



## 2018 – Hongkong-Zhuhai-Macau Bridge

**Background:** The world's longest sea bridge system of 55 km total length spreads over bridges, tunnels and artificial islands. Every day, this mega structure is utilized by approximately 250,000 people.

**Challenge:** The Pearl River Delta is marked by extreme wind speeds and a high risk of seaquakes. It is also a busy waterway, which means that all parts of the bridge structure must be able to withstand potential collisions.

**Solution:** Safety concept through continuous condition monitoring leveraging high-precision accelerometers, real-time evaluation and effective analysis for early detection of material changes and constant checks into structural integrity.

**Product:** Triaxial capacitive accelerometers ASC CS-1611LN with analog current output of 4-20 mA for loss-free signal transmission from the sensors installed in the bridge pillars.



## 2022 – Plug & Play solution for construction monitoring

**Background:** Sensor solutions operated with as few additional peripherals as possible are ideal for ad hoc, quick, uncomplicated building inspections.

**Challenge:** The development of flexible, mobile systems for inspections of bridges and other communal structures, as spontaneous measurements are generally complex and require time, personnel and extensive materials.

**Solution:** Extension of seismic grade sensors of the analog ASC EQ series with powerful analog-to-digital conversion and built-in Butterworth anti-aliasing filter. Standard digital USB interface creates plug & play solution for use with conventional laptops.

**Product:** Digital ASC DiSens EQ accelerometers with a resolution of <1 µg or up to 21.5 ENOB (effective number of bits) at 80 Hz (-3 dB) bandwidth and 500 Hz sampling frequency.

## 2022 – New approaches to railroad bridge monitoring

**Background:** Across Germany, more than 25,000 railway bridges that fall into the accountability of the bridge monitoring department at DB InfraGO AG require regular inspections.

**Challenge:** Leverage ASC expertise through innovative pilot projects to make the monitoring and proactive maintenance of critical railroad bridges simpler, safer and more cost-effective in the long term.

**Solution:** A key indicator of the condition of a railroad bridge is its displacement. Innovative accelerometer systems offer a great supplement to traditional reference-based monitoring methods. Precise real-time measurements enable the tracking of dynamic displacement.

**Product:** ASC AiSys ECO smart sensor systems combine digital accelerometers with integrated algorithms. Built-in functions include frequency analysis using FFT and the calculation of dynamic velocity and deflection.



ASC AiSys ECO-3321

**Case study available**

## 2023 – Historic Nibelungen Bridge in Worms

**Background:** As part of the DFG priority program SPP 2388, the German Federal Institute for Materials Research and Testing is working on future-ready structural testing and monitoring. The aim is to extend economic service life while ensuring adequate safety.

**Challenge:** New methods for digital structural monitoring and predictive maintenance management. The historic Nibelungen Bridge in Worms serves as a demonstration and validation object.

**Solution:** Digital twin for safe bridge operation, smart reference data for preventive monitoring, flexible sensors for recording structural dynamics, reliable sensors with maximum precision and long-term stability despite a wide range of changing conditions.

**Product:** ASC AiSys ECO smart sensor systems combine digital accelerometers with integrated algorithms. The CAN bus capability enables the transmission of pre-processed information within sensor networks.



ASC AiSys ECO-3321

**Case study available**

## 2025 – Rail infrastructure project in the UK

**Background:** The viaduct stretches for more than 3.4 km over a series of lakes and waterways. It is part of a high-speed rail line, therefore, instrumentation and permanent monitoring are required.

**Challenge:** The bridge was built in an area of diverse landscapes with parks, green spaces and water reservoirs. The valley represents an intensely frequented public area.

**Solution:** Integration of high-performance, servo-balanced quartz accelerometers in the deck segments of the bridge and the noise barriers.

**Product:** Uniaxial accelerometers of the ASC QBA series with analog current output of 4-20 mA and a resolution of better than 1  $\mu\text{g}$ . Outstanding long-term stability of the scaling factor (K1: 1200 ppm) and the bias (K0: 1200  $\mu\text{g}$ ).



ASC QBA-1415

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# Reliable monitoring of bridges?

## Talk to us!

A selection from our extensive range of high-precision ASC accelerometers in three essential performance categories: **Entry – High – Premium.**

|                                                                                     | Sensor series         | # of sensitive directions   | Measurement ranges                  | Noise density      | Frequency range   | Temperature range | Housing                | Output signal/Interface                                        |
|-------------------------------------------------------------------------------------|-----------------------|-----------------------------|-------------------------------------|--------------------|-------------------|-------------------|------------------------|----------------------------------------------------------------|
| <b>ENTRY LEVEL (achievable precision &lt;25 µg)</b>                                 |                       |                             |                                     |                    |                   |                   |                        |                                                                |
|    | <b>ASC ECO</b>        | uniaxial, biaxial, triaxial | 2, 4, 8, 10, 20 or 40 g             | 22.5 to 90 µg/√Hz  | DC (0) to 630 Hz  | -20 to +125 °C    | Aluminum (IP68)        | Analog – voltage, ± 2.4 V (differentiell)                      |
|   | <b>ASC ECO CS</b>     | uniaxial, biaxial, triaxial | 2, 4, 8, 10, 20 or 40 g             | 35.0 to 145 µg/√Hz | DC (0) to 630 Hz  | -20 to +80 °C     | Aluminum (IP67)        | Analog – current, 4 to 20 mA (single-ended)                    |
|  | <b>ASC DiSens ECO</b> | triaxial                    | 2/4/8 g or 10/20/40 g               | 22.5 to 90 µg/√Hz  | DC (0) to 630 Hz  | -40 to +85 °C     | Aluminum (IP67)        | Digital – CAN, RS232 ± 512,000 LSB (FSO)                       |
|  | <b>ASC AiSys ECO</b>  | triaxial                    | 2/4/8 g or 10/20/40 g               | 22.5 to 90 µg/√Hz  | DC (0) to 630 Hz  | -40 to +85 °C     | Aluminum (IP67)        | Digital – CAN, RS232 Integrated algorithms, frequency analyses |
| <b>HIGH LEVEL (achievable precision &lt;10 µg)</b>                                  |                       |                             |                                     |                    |                   |                   |                        |                                                                |
|  | <b>ASC OS MF</b>      | uniaxial, biaxial, triaxial | 2, 5, 10, 30, 50, 100 or 200 g      | 10 to 680 µg/√Hz   | DC (0) to 2500 Hz | -40 to +100 °C    | Stainless steel (IP68) | Analog – voltage, ± 2.7 V (differential)                       |
|  | <b>ASC OS LN</b>      | uniaxial, biaxial, triaxial | 2, 5, 10, 25, 50, 100, 200 or 400 g | 7 to 400 µg/√Hz    | DC (0) to 2000 Hz | -40 to +100 °C    | Stainless steel (IP68) | Analog – voltage, ± 4.0 V (differential)                       |
|  | <b>ASC CS LN</b>      | uniaxial, biaxial, triaxial | 2, 5, 10, 25 or 50 g                | 10 to 100 µg/√Hz   | DC (0) to 1600 Hz | -20 to +70 °C     | Aluminum (IP67)        | Analog – current, 4 to 20 mA (single-ended)                    |
| <b>PREMIUM LEVEL (achievable precision &lt;1 µg)</b>                                |                       |                             |                                     |                    |                   |                   |                        |                                                                |
|  | <b>ASC QBA</b>        | uniaxial                    | 30 g                                | <3 µg/√Hz          | DC (0) to 300 Hz  | -40 to +70 °C     | Stainless steel (IP67) | Analog – current, 4 to 20 mA (single-ended)                    |
|  | <b>ASC EQ</b>         | uniaxial, biaxial, triaxial | 3 or 5 g                            | 0.7 to 1.2 µg/√Hz  | DC (0) to 700 Hz  | -40 to +85 °C     | Aluminum (IP65)        | Analog – voltage, ± 2.7 V (differential)                       |
|  | <b>ASC DiSens EQ</b>  | triaxial                    | 3 or 5 g                            | 0.7 to 1.2 µg/√Hz  | DC (0) to 80 Hz   | -40 to +85 °C     | Aluminum (IP65)        | Digital – USB                                                  |