

g ASC 4221MF
MEMS Capacitive Accelerometer



SPECIFICATIONS

- Uniaxial
- MEMS Capacitive
- Measurement Range: ± 2 to ± 200 g
- Noise Density: 10 to 680 $\mu\text{g}/\sqrt{\text{Hz}}$
- Frequency Range ($\pm 5\%$): DC to 2900 Hz
- Aluminum Housing
- Made in Germany

MEMS CAPACITIVE ACCELEROMETER

The key components in capacitive accelerometers are high-quality micro-electro-mechanical systems (MEMS) that feature excellent long-term stability and reliability. This technology enables the measurement of static (DC) and constant accelerations, which can be used to calculate the velocity and displacement of moving objects. Depending on the design of the spring-mass-damping system, however, it is also possible to detect dynamic (AC) accelerations with amplitudes up to ± 200 g and within a frequency response range of up to 2.9 kHz ($\pm 5\%$) or 7 kHz (± 3 dB). Other advantages of capacitive accelerometers are their outstanding temperature stability, excellent response behavior and achievable resolution.

DESCRIPTION

The accelerometers of type ASC 4221MF are based on proven MEMS technology and capacitive operating principle. The integrated electronic circuitry enables a differential analog voltage output (± 2.7 V FSO) and flexible power supply voltage from 5 to 40 VDC. The MF (Medium Frequency) accelerometers from ASC provide a wide frequency response range from 0 Hz to 7 kHz (± 3 dB) and an extremely robust design with shock resistance up to 6,000 g.

The sensors feature a lightweight, reliable aluminum housing with protection class IP67 and an integrated cable with configurable length and connectors.

The uniaxial ASC 4221MF have an ultra-compact design and weigh only 3 grams. This makes them ideal for measuring applications in hard-to-access installations, such as testing the operational stability of automotive components.

FEATURES

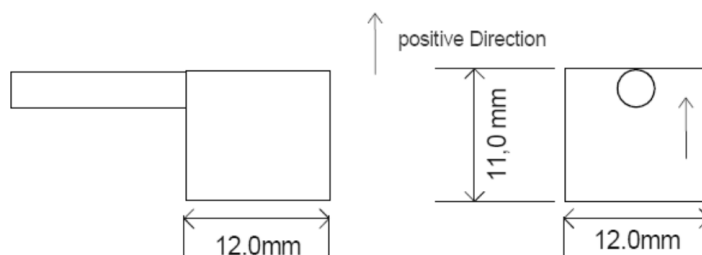
- Low Noise Differential Voltage Output
- DC Response, Gas damped
- Very High Shock Resistance
- Excellent Offset and Scale Factor Stability

OPTIONS

- Customized Cable Length
- Customized Connector
- TEDS Module

APPLICATIONS

- Operational Stability Tests
- Structural Analyses
- Flutter Tests





TYPICAL SPECIFICATIONS

Dynamic

Measurement Range	g	±2	±5	±10	±30	±50	±100	±200
Scale Factor (sensitivity)	mV/g	1350	540	270	90	54	27	13.5
Noise Density	µg/√Hz	10	20	35	100	170	340	680
Specified Frequency Response Range (±5 %)	Hz	0 to 700	0 to 1150	0 to 2000	0 to 2300	0 to 2700	0 to 2900	0 to 2500
Frequency Response Range (±3 dB)	Hz	0 to 1150	0 to 1900	0 to 3200	0 to 4000	0 to 4500	0 to 5000	0 to 7000
Amplitude Non - Linearity	% FSO	<0.1 (typ) <0.3 (max)						
Transverse Sensitivity	%	<1						

Electrical

Power Supply Voltage	V	5 to 40						
Operating Current Consumption	mA	<10						
Offset (bias)	mV	±10						
Broadband Noise (over specified frequency range ±5 %)	µV	250	310	410	440	475	490	460
Resistive Load	kΩ	1000						
Isolation		Case Isolated						

Environmental

Temperature Coefficient of the Scale Factor	ppm/K	120 (typ) 20 to 220 (max)						
Temperature Coefficient of the Offset (max)	mg/K	±0.2	±0.5	±1	±3	±5	±10	±20
Operating Temperature Range	°C	-20 to +80						
Storage Temperature Range	°C	-20 to +80						
Shock Limit (0.1 ms, half - sine)	g	6000						
Protection Class		IP67						

Physical

Sensing Element	MEMS Capacitive							
Case Material	Anodized Aluminum							
Connector at Cable End	Optional							
Mounting	Adhesive Screw Holes							
Weight (without cable)	gram	22						
Cable	13 gram per meter AWG 30 Polyurethane (PUR) Diameter 3 .0 mm							



■ SENSOR CALIBRATION

Factory Calibration (supplied with the sensor)

Part Number									
Measurement Range (sensor)	g	±2	±5	±10	±30	±50	±100	±200	
Applied Frequency (min)	Hz	1	10	10	10	10	10	10	
Applied Frequency (max)	Hz	100	1150	2000	2300	2700	2900	2500	
Input Amplitude	m/s ²	5	5	50	100	200	200	200	
Reference Frequency for Determination of Scale Factor	Hz	16	80	80	80	80	80	80	

Calibration according DIN ISO 17025 (order separately)

Part Number									
Measurement Range (sensor)	g	±2	±5	±10	±30	±50	±100	±200	
Applied Frequency (min)	Hz	0.5	10	10	10	10	10	10	
Applied Frequency (max)	Hz	150	1900	3200	4000	4500	5000	7000	
Input Amplitude	m/s ²	5	5	50	100	200	200	200	
Reference Frequency for Determination of Scale Factor	Hz	16	80	80	80	80	80	80	

Remarks :

- The conversion factor 1g corresponds to 9.80665 m/s².
- If any other calibration procedure is required, don't hesitate to contact us. Our services include both factory calibration and calibration in accordance with DAKkS guidelines.
- Furthermore, sensors have to be calibrated regularly to ensure accurate and precise results. On request we will be glad to remind you of the next scheduled calibration of your sensors.

Cable Code / Pin Configuration (4 Wire System)

Pin	Color Code	Description	
1	Supply +	Red	Power supply voltage +5 to +40 VDC
2	Supply -	Black	Power GND
3	Signal +	Green	Positive, analog output voltage signal for differential mode
4	Signal -	White	Negative, analog output voltage signal for differential mode



ORDERING INFORMATION

Series	Model	- Range [g]	- Cable Length [m]	Connector & Pinout
ASC 42	21MF	002	6	A
		005		
		010		
		030		
		050		
		100		
		200		

Example:

ASC 4221MF- 002- 6A

Ordering information are based on standard configurations. All customized versions regarding connector and/or pinout will lead to a corresponding product match code :

- Standard length of the integrated cable is 6 meters. However, different customized cable lengths are possible on request.
- Standard version has no connector at the cable end which is identified by "A" in the product match code. However, it is possible to assemble almost all connector types during production.



■ SAFETY PRECAUTION FOR INSTALLING AND OPERATING

This data sheet is a part of the product. Read the data sheet carefully before using the product and keep it available for future operation. Handling, electrical connections, mounting or any other work performed at the sensor must be carried out by authorized experts only. Appropriate safety precautions must be taken to exclude any risk of personal injury and damage to operating equipment as a result of a sensor malfunction.

Handling

The sensor is packaged in a reliable housing to protect the sensing elements and integrated electronic components from the ambient environment. However, poor handling of the product can lead to damages that may not be visible and cause electrical failure or reliability issues. Handle the component with caution:

- Avoid shocks and impacts on the housing, such as dropping the sensor on hard surface
- Never move the sensor by pulling the cable
- Make sure that the sensor is used within the specified environmental conditions
- Transport and store the sensor in its original or similar packaging
- The sensor should be mounted on a stable flat surface with all screws tightened or other mounting options
- Avoid any deformation during mounting the sensor
- Mounting tolerances may have an influence on the measured result

Electrical

ASC's inertial sensors are working with many established data acquisition systems. However, make sure that a proper DAQ is used, for the corresponding operation principle of the sensor. Furthermore, suitable precautions shall be employed during all phases of shipment, handling and operating:

- Active sensor pins are susceptible to damage due to electrostatic discharge (ESD)
- Make sure that the sensor is used within the specified electrical conditions
- Check all electrical connections prior to initial setup of the sensor
- Completely shield the sensor and connecting cable
- Do not perform any electrical modifications at the sensor
- Do not perform any adaptations on the wiring or connectors while the device under power
- Never plug or unplug the electrical connection while the sensor is under power
- When a certain pin is not used during operation, make sure that the pin is insulated

Quality

- We have a quality management system according to ISO 9001:2015.
- The Deutsche Akkreditierungsstelle GmbH (DAkkS) has awarded to our calibration laboratory the DIN EN ISO/IEC 17025:2018 accreditation for calibrations and has confirmed our competence to perform calibrations in the field of mechanical acceleration measurements. The pictured DAkkS - ILAC logo refers exclusively to the accredited service.
- All ASC products are **CE** - compliant.

