

## MEMS Capacitive Accelerometer

### ASC 5421MF | ASC 5425MF

Triaxial  
 MEMS Capacitive  
 Measurement Range:  $\pm 2$  to  $\pm 200$  g  
 Noise Density: 10 to 680  $\mu\text{g}/\sqrt{\text{Hz}}$   
 Frequency Range ( $\pm 5\%$ ): DC to 2900 Hz  
 Aluminum or Stainless-Steel 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  $\pm 200$  g and within a frequency response range of up to 2.9 kHz ( $\pm 5\%$ ) or 7 kHz ( $\pm 3$  dB). Other advantages of capacitive accelerometers are their outstanding temperature stability, excellent response behavior and achievable resolution.

### Description

The accelerometers of type ASC 5421MF and ASC 5425MF are based on proven MEMS technology and capacitive operating principle. The integrated electronic circuitry enables a differential analog voltage output ( $\pm 2.7$  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 ( $\pm 3$  dB) and an extremely robust design with shock resistance up to 6,000 g.

The sensor ASC 5421MF features a lightweight aluminum housing and the sensor ASC 5425MF provides a robust stainless-steel housing, both with protection class IP65 and an integrated cable with configurable length and connectors.

The triaxial accelerometers enable the detection of smallest accelerations over a wide frequency response range in three degrees of freedom, e.g. for test bench applications, vehicle and road monitoring as well as resonance and flutter tests in aviation.

### Features

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

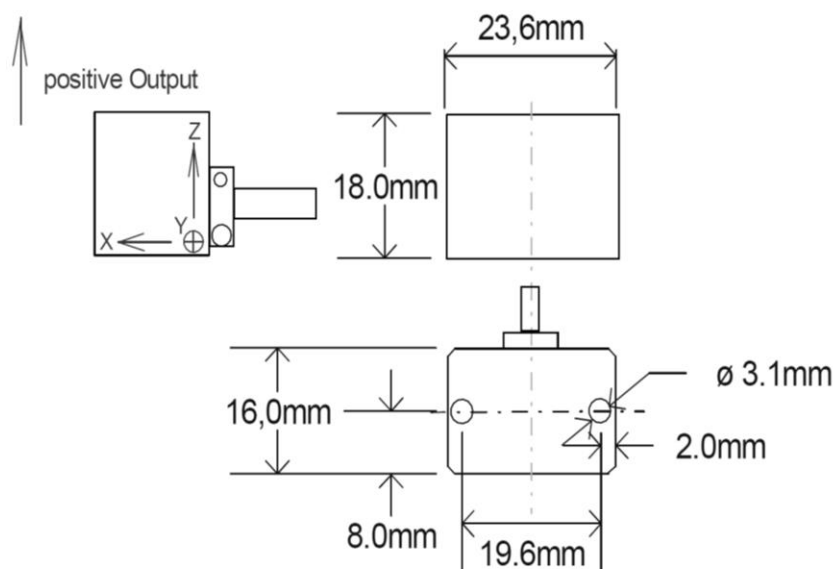
### Options

- Customized Cable Length
- Customized Connector
- TEDS Module

### Applications

- NVH and Operational Stability
- Driving and Ride Comfort Tests
- Vehicle and Running Dynamics

More applications in several markets are figured out on our web page [www.asc-sensors.de](http://www.asc-sensors.de)



# ASC 5421MF | ASC 5425MF

## MEMS Capacitive Accelerometer



### Typical Specification

#### 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	<15						
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	-40 to +125						
Storage Temperature Range	°C	-40 to +125						
Shock Limit (0.1 ms, half-sine)	g	6000						
Protection Class		IP65						

#### Physical

Sensing Element		MEMS Capacitive						
Case Material		ASC 5421MF: Anodized Aluminum ASC 5425MF: Stainless-Steel						
Connector at Cable End		Optional						
Mounting		Adhesive   Screw Holes						
Weight (without cable)	gram	ASC 5421MF: 20 ASC 5425MF: 40						
Cable		30 gram per meter   AWG 30   Polyurethane (PUR)   Diameter 4.5 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 <sup>2</sup>	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 <sup>2</sup>	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 1 g corresponds to 9.80665 m/s<sup>2</sup>.
- 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 (12 Wire System) including separate Power Supply for all Axes**

Pin	Color Code	Description
1	Supply +	Red/Violet X-Axis: power supply voltage +5 to +40 VDC
2	Supply -	Black/Violet X-Axis: power GND
3	Signal +	Green/Violet X-Axis: positive, analog output voltage signal for differential mode
4	Signal -	White/Violet X-Axis: negative, analog output voltage signal for differential mode
5	Supply +	Red/Grey Y-Axis: power supply voltage +5 to +40 VDC
6	Supply -	Black/Grey Y-Axis: power GND
7	Signal +	Green/Grey Y-Axis: positive, analog output voltage signal for differential mode
8	Signal -	White/Grey Y-Axis: negative, analog output voltage signal for differential mode
9	Supply +	Red Z-Axis: power supply voltage +5 to +40 VDC
10	Supply -	Black Z-Axis: power GND
11	Signal +	Green Z-Axis: positive, analog output voltage signal for differential mode
12	Signal -	White Z-Axis: negative, analog output voltage signal for differential mode

**Cable Code / Pin Configuration (8 Wire System) including common Power Supply for all Axes**

Pin	Color Code	Description
1	Supply +	Red
2	Supply -	Black
3	Signal +	Green/Violet
4	Signal -	White/Violet
5	Signal +	Green/Grey
6	Signal -	White/Grey
7	Signal +	Green
8	Signal -	White

**Cable Configuration**

**8 Wire System - 8L**

Common power supply for all axes, no cable switch



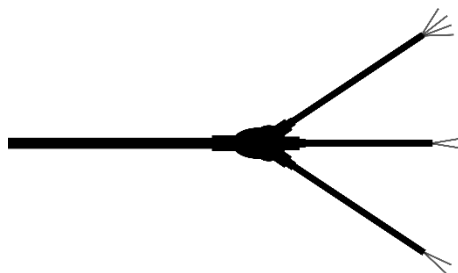
**12 Wire System - 12L**

Separate power supply for all axes, no cable switch



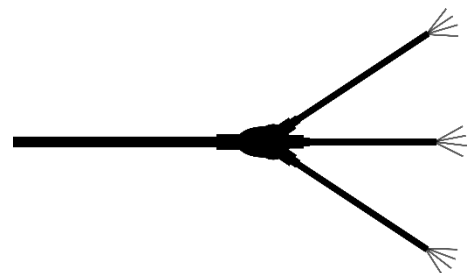
**8 Wire System - 8L3**

Common power supply for all axes, including cable switch



**12 Wire System - 12L3**

Separate power supply for all axes, including cable switch



**Ordering Information**

Ordering information are based on standard configurations. The integrated cable features a length of 6 meters and has no connector at the cable end which is identified by "A" in the product match code. However different lengths and the assembling of almost all connector types is possible on request.

Series	Model	- Range [g]	- Cable Length [m]	Connector & Pinout	- Cable Configuration
ASC 54	21MF (Aluminum)	002	6	A	8L
	25MF (Stainless-Steel)	005			8L3
		010			12L
		030			12L3
		050			
		100			
		200			

*Example:*

**ASC 5421MF-002-6A-8L**

Remark: All customized versions regarding cable length, connector and/or pinout will lead to a corresponding product match code.

### 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.

#### Made in Germany



analyzing



monitoring



testing



measuring