

ASC RAIL-x15LN

Uniaxial, Biaxial, Triaxial

MEMS Capacitive

Measurement Range: ± 2 to ± 400 g

Noise Density: 7 to 400 $\mu\text{g}/\sqrt{\text{Hz}}$

Frequency Range ($\pm 5\%$): DC to 2000 Hz

Stainless-Steel Housing (IP68)

Made in Germany



MEMS Capacitive Accelerometer

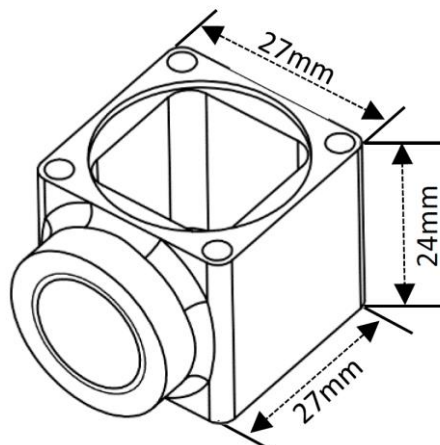
The key components in capacitive accelerometers are high-quality micro-electro-mechanical systems (MEMS) that feature excellent long-term stability and reliability. This technology enables the measurement of static (DC) and constant accelerations, which can be used to calculate the velocity and displacement 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 ± 400 g and within a frequency response range of up to 2 kHz ($\pm 5\%$) or 4.2 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 RAIL-x15LN are based on proven MEMS technology and capacitive operating principle. The integrated electronic circuitry enables a differential analog voltage output (± 4 V FSO) and flexible power supply voltage from 6 to 40 VDC. The LN (Low Noise) accelerometers from ASC provide an outstanding noise performance from 7 to 400 $\mu\text{g}/\sqrt{\text{Hz}}$ which is essential for demanding measurements of smallest frequencies and amplitudes.

The sensors feature a robust and reliable stainless-steel housing (V2A material number 1.4301) leading to hermetic sealing and protection class IP68. The cable gland VariaPro Rail was tested according fire protection standards **DIN EN 45545-2** and **45545-3**. Furthermore, rail certified and integrated cable RADOX TENUIS-TW 600V MM S complies with the technical requirements of EN 50306 (particularly low temperature and high level of oil and fuel resistance). It provides a high level of thermal resistance due to standard fire protection on railway vehicles according to:

- **DIN 5510-2**
- **EN 45545-2**
- **GOST 31565**
- **NF F 16-101**
- **NFPA 130**
- **UNI CEI 11170-3**



Features

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

Options

- Customized Cable Length
- Customized Connector
- TEDS Module

Applications

The application-specific housing of the accelerometers allows reliable operation even in harshest environmental conditions. They are ideally suited for bogie stability tests and monitoring applications of vehicles and their components in the rail transport sector.

More applications in several markets are figured out on www.pm-instrumentation.com

Typical Specification

Dynamic

Measurement Range	g	±2	±5	±10	±25	±50	±100	±200	±400
Scale Factor (sensitivity)	mV/g	2000	800	400	160	80	40	20	10
Noise Density	µg/√Hz	7	12	18	25	50	100	200	400
Frequency Response Range (±5 %)	Hz	0 to 250	0 to 400	0 to 700	0 to 1300	0 to 1600	0 to 1700	0 to 1900	0 to 2000
Frequency Response Range (±3 dB)	Hz	0 to 525	0 to 800	0 to 1100	0 to 1750	0 to 2100	0 to 3000	0 to 3600	0 to 4200
Amplitude Non-Linearity	% FSO	<0.15 (typ) <0.5 (max)							
Transverse Sensitivity	%	<2 (typ) <3 (max)							

Electrical

Power Supply Voltage	V	6 to 40							
Operating Current Consumption	mA	<20							
Offset (bias)	mV	±80	±80	±40	±40	±40	±40	±40	±40
Broadband Noise (over frequency range ±5 %)	µV	225	195	190	145	160	165	175	180
Output Impedance	Ω	90							
Isolation		Case isolated							

Environmental

Temperature Coefficient of the Scale Factor (max)	ppm/K	±200							
Temperature Coefficient of the Offset (max)	mg/K	±0.8	±2	±4	±10	±20	±40	±80	±160
Operating Temperature Range	°C	-40 to +100							
Storage Temperature Range	°C	-40 to +100							
Shock Limit (max peak)	g	2000	2000	5000	5000	5000	5000	5000	5000
Protection Class		IP68 Please note: the housing is hermetically sealed and therefore not repairable.							

Physical

Sensing Element		MEMS Capacitive							
Case Material		Stainless-Steel including PG Gland Varia ProRail							
Connector at Cable End		Optional							
Mounting		Adhesive Screw Holes							
Weight (without cable)	gram	90							
Cable (uniaxial)		RADOX TENUIS-TW 2 x 2 x 0.75 mm ² 107 gram per meter Diameter 8.2 ± 0.3 mm							
Cable (biaxial and triaxial)		RADOX TENUIS-TW 8 x 0.5 mm ² 109 gram per meter Diameter 7.5 ± 0.3 mm							

Sensor Calibration

Factory Calibration (supplied with the sensor)

Part Number		#16722	#16724	#16726	#16728	#16730	#16732	#16734	#16736
Part Number (Triaxial)		#16723	#16725	#16727	#16729	#16731	#16733	#16735	#16737
Measurement Range (sensor)	g	±2	±5	±10	±25	±50	±100	±200	±400
Applied Frequency (min)	Hz	1	10	10	10	10	10	10	10
Applied Frequency (max)	Hz	100	400	700	1300	1600	1700	1900	2000
Input Amplitude	m/s ²	5	5	50	100	200	200	200	200
Reference Frequency for Determination of Scale Factor	Hz	16	80	80	80	80	80	80	80

Calibration according DIN ISO 17025 (order separately)

Part Number		#16738	#16740	#16742	#16744	#16746	#16748	#16750	#16752
Part Number (Triaxial)		#16739	#16741	#16743	#16745	#16747	#16749	#16751	#16753
Measurement Range (sensor)	g	±2	±5	±10	±25	±50	±100	±200	±400
Applied Frequency (min)	Hz	0.5	10	10	10	10	10	10	10
Applied Frequency (max)	Hz	150	800	1100	1750	2100	3000	3600	4200
Input Amplitude	m/s ²	5	5	50	100	200	200	200	200
Reference Frequency for Determination of Scale Factor	Hz	16	80	80	80	80	80	80	80

Please note: The conversion factor 1 g corresponds to 9.80665 m/s². If any other calibration procedure is required, don't hesitate to contact us.

Cable Configuration

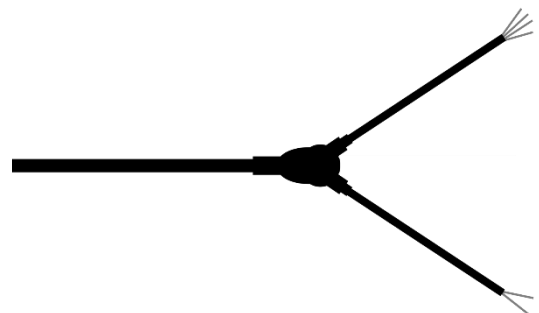
4 Wire System - 4L (Uniaxial)

Common power supply for all axes, no cable switch



6 Wire System - 6L2 (Biaxial)

Common power supply for all axes, including cable switch



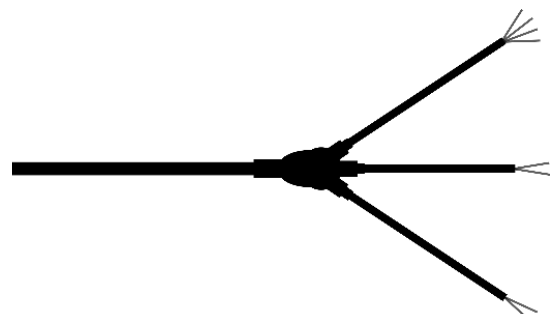
6 Wire System - 6L (Biaxial)

Common power supply for all axes, no cable switch



8 Wire System - 8L3 (Triaxial)

Common power supply for all axes, including cable switch



8 Wire System - 8L (Triaxial)

Common power supply for all axes, no cable switch



Cable Code / Pin Configuration (4 Wire System) for uniaxial ASC RAIL-115LN

Pin (black numbered)	Description
1 Supply +	power supply voltage +6 to +40 VDC
2 Supply -	power GND
3 Signal +	positive, analog output voltage signal for differential mode
4 Signal -	negative, analog output voltage signal for differential mode

Cable Code / Pin Configuration (6 Wire System) for biaxial ASC RAIL-215LN

Pin (black numbered)	Sensitive Directions	Description
1 Supply +	Common power supply for all axes	power supply voltage +6 to +40 VDC
2 Supply -		power GND
3 Signal +	X-Axis:	positive, analog output voltage signal for differential mode
4 Signal -	X-Axis:	negative, analog output voltage signal for differential mode
5 Signal +	Y-Axis:	positive, analog output voltage signal for differential mode
6 Signal -	Y-Axis:	negative, analog output voltage signal for differential mode

Cable Code / Pin Configuration (8 Wire System) for triaxial ASC RAIL-315LN

Pin (black numbered)	Sensitive Directions	Description
1 Supply +	Common power supply for all axes	power supply voltage +6 to +40 VDC
2 Supply -		power GND
3 Signal +	X-Axis:	positive, analog output voltage signal for differential mode
4 Signal -	X-Axis:	negative, analog output voltage signal for differential mode
5 Signal +	Y-Axis:	positive, analog output voltage signal for differential mode
6 Signal -	Y-Axis:	negative, analog output voltage signal for differential mode
7 Signal +	Z-Axis:	positive, analog output voltage signal for differential mode
8 Signal -	Z-Axis:	negative, analog output voltage signal for differential mode

Ordering Information

Series	Model	Range [g]	Cable Length [m]	Connector & Pinout	Cable Configuration
ASC RAIL	115N (Uniaxial)	002	6	A	4L (Uniaxial)
	215LN (Biaxial)	005			6L (Biaxial)
	315LN (Triaxial)	010			6L2 (Biaxial)
		025			8L (Triaxial)
		050			8L3 (Triaxial)
		100			
		200			
		400			

Example:

ASC RAIL-115LN-002-6A-4L

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.
- Furthermore, sensors have to be calibrated regularly to ensure accurate and precise results. Our services include both factory calibration and calibration in accordance with DAkkS guidelines. On request we will be glad to remind you of the next scheduled calibration of your sensors.

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
- When adhesives are used to mount the sensors, please select the corresponding products according to permanent or removable mounting, ambient temperature range as well as quality of the mounting surface
- 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 registration number of the certificate is **D-K-18110-01-00**.
- All ASC products are **CE**-compliant.

Made in Germany



analyzing



monitoring



testing



measuring