

## ASC IMU 7.X.Y

- ▶ 6 Degrees of Freedom (DOF)
- ▶ Analog Output
- ▶ Detachable Cable
- ▶ Aluminium Housing
- ▶ Made in Germany

### Features

- ▶ Acceleration Range:  
±2g to ±50g  
Rotation Range: ±75°/s to  
±900°/s
- ▶ DC Response
- ▶ Excellent Bias and Scale  
Factor Stability
- ▶ Protection Class IP65
- ▶ Low Power Consumption
- ▶ Compact Design and  
Lightweight (26 gram)

### Options

- ▶ Customised Cable Length and  
Configuration
- ▶ Customised Connector

### Applications

- ▶ Indoor Navigation and  
Pointing
- ▶ Precision Agriculture
- ▶ Camera/Antenna/Platform  
Stabilisation
- ▶ Industrial and Robotics
- ▶ Biomechanics (Motion  
Tracking; Gesture Sensing)
- ▶ Marine (Yacht Stabilisation;  
Tests on Ship Models)
- ▶ Automotive In-Car Navigation
- ▶ Precision GPS Vehicle and  
Personal Navigation Aiding  
(Dead Reckoning Navigation)
- ▶ Vehicle Driving Tests

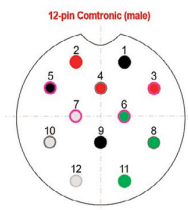
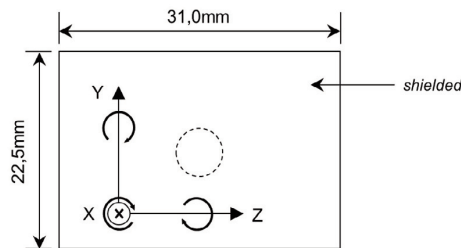


### Description

An Inertial Measurement Unit (IMU) is a 6-axial system that measures linear and angular motion using a combination of accelerometers and gyroscopes. MEMS based IMUs incorporate an assortment of precision inertial sensors, including a triaxial accelerometer and a triaxial gyroscope. The IMU thus outputs raw acceleration and rotation rate signals, which could be further integrated to obtain the actual position and orientation.

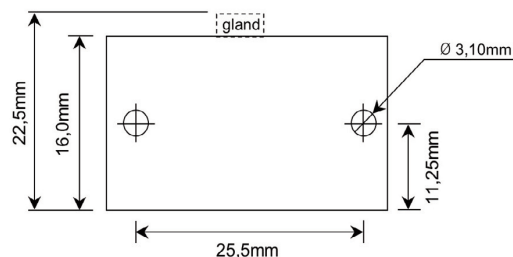
### ASC IMU 7.X.Y

ASC IMU 7.X.Y incorporates either the LN-series (Low-Noise) accelerometers or the MF-series (Medium-Frequency) accelerometers, featuring an acceleration range from ±2g to ±50g. The IMU features MEMS vibrating ring gyros with a rate range from ±75°/s to ±900°/s. ASC IMU 7.X.Y can be powered by a DC power supply where the output voltage is independent of the supply. The miniature IMU is made of lightweight anodised aluminium housing and features the industry standard 12-pin comtronic connector and a detachable cable.



#### Pin assignment:

Power Supply:	Acceleration:
Pin 1: Power Supply - (black)	Pin 6: Signal + X (green / violet)
Pin 2: Power Supply + (red)	Pin 7: Signal - X (violet / violet)
	Pin 8: Signal + Y (green / grey)
	Pin 9: not connected
	Pin 10: Signal - Y (grey / grey)
	Pin 11: Signal + Z (green)
	Pin 12: Signal - Z (black / violet)



## **MEMS Accelerometers**

ASC's capacitive accelerometers are based on MEMS sensing technology and produce an analog voltage proportional to the input acceleration. The accelerometers can measure both static (gravity) and dynamic accelerations. ASC's MEMS capacitive accelerometers can be used for very low to medium frequency vibration measurements. The sensors feature a MEMS sensor element where the seismic mass is connected between two conductive capacitor plates. When subjected to an input acceleration, the seismic mass oscillates between the two capacitor plates and there is a change in the capacitance. This change in capacitance is converted via an ASIC (Application Specific Integrated Circuit) into a low impedance analog voltage output signal.

## **MEMS Gyroscopes**

ASC's precision navigation and pointing gyroscopes are made of robust silicon MEMS vibrating ring elements. The gyro detects the magnitude and direction of angular velocity by using the coriolis force effect. As the gyro is rotated, coriolis forces acting on the silicon ring cause radial movement at the ring perimeter, the magnitude of which is proportional to the angular velocity of rotation. The gyro thus produces an analog voltage signal, which is linearly proportional to the angular rate. The balanced ring design results in excellent shock and vibration rejection.

## **Typical Specifications**

### **ASC IMU 7.X.Y**

#### **DYNAMIC**

Measurement Range	g °/s	Acceleration: ±2 to ±50 Rotation: ±75 to ±900
Shock Limit	g <sub>peak</sub>	±500 (operating) ±2000 (unpowered)

#### **ELECTRICAL**

Excitation Voltage	V DC	LN: 6 to 40	MF: 5 to 40
Current Consumption	mA	LN: 30	MF:21
Isolation		Case Isolated	

#### **ENVIRONMENTAL**

Operating Temperature	°C	-40 to +85
Storage Temperature	°C	-40 to +100
Protection Class		IP65

#### **PHYSICAL**

Sensing Elements		MEMS Capacitive Accelerometers & MEMS Vibrating Ring Gyros
Case Material		Anodised Aluminium
Connector		12-pin Comtronic
Mounting		M3 screws
Weight (without cable)	gram	26
Cable		12-wire PUR; 19 gram/meter; AWG 30; Diameter: 4.35 ±0.15mm

## ASC IMU 7.X.Y

### ASC ACCELEROMETERS LN-SERIES

#### DYNAMIC

Measurement Range	g	±2	±5	±10	±25	±50
Sensitivity	mV/g	2000	800	400	160	80
Frequency Response: ±5%	Hz	0-100	0-100	0-300	0-500	0-650
Amplitude Non-Linearity	% FSO	<0.5				
Transverse Sensitivity	%	typ. 1, max. 3				

#### ELECTRICAL

Zero Acceleration Output	mV	±80	±80	±40	±40	±40
Spectral Noise	µg/√Hz	7	12	18	25	50
Residual / Broadband Noise (±5% Frequency Range)	µV	140	95	125	90	100

#### ENVIRONMENTAL

Thermal Sensitivity Shift	%/°C	0.02				
Thermal Zero Shift	mg/°C	0.15	0.5	1	2.5	5

### ASC ACCELEROMETERS MF-SERIES

#### DYNAMIC

Measurement Range	g	±2	±5	±10	±30	±50
Sensitivity	mV/g	1350	540	270	90	54
Frequency Response: ±5%	Hz	0-700	0-700	0-1400	0-1600	0-1800
Amplitude Non-Linearity	% FSO	<0.3				
Transverse Sensitivity	%	<3				

#### ELECTRICAL

Zero Acceleration Output	mV	<±30				
Spectral Noise	µg/√Hz	10	20	35	100	170
Residual / Broadband Noise (±5% Frequency Range)	µV	250	250	360	360	390

#### ENVIRONMENTAL

Thermal Sensitivity Shift	%/°C	typ. 0.012				
Thermal Zero Shift	mg/°C	0.2	0.5	1	3	5

## ASC IMU 7.X.Y

### ASC MEMS GYROSCOPES

#### DYNAMIC

Measurement Range	°/s	±75	±150	±300	±900
Sensitivity	mV/°/s	13.2	6.6	3.3	1.1
Sensitivity Variation at 25° C	%	typ. ±0.3, max. ±1			
Bandwidth (max.)	Hz	150			
Non-Linearity	%	typ. ±0.06, max. ±0.15			
g-Sensitivity (Linear Acceleration)	°/s/g	typ. 0.08, max. 0.2			


#### ELECTRICAL

Bias (for cables up to 10 m)	V	1.65 ± 0.08			
Bias Variation with Temperature (referred to the value at +25°C)	°/s	typ. 1, max. ±3			
Bias Stability	°/hr	12			
Rate Noise Density	°/s/√Hz	typ. 0.018, max. 0.025			
Angular Random Walk	°/√hr	0.2 (Allan Deviation; τ=1s)			
Vibration Induced Noise	°/s/g <sup>2</sup>	typ. 0.06, max. 0.072			

#### ENVIRONMENTAL


Sensitivity Variation Over Temperature (referred to the value at +25°C)	%	typ. ±0.5, max. ±1.5			
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**Cable Configurations ASC IMU 7**



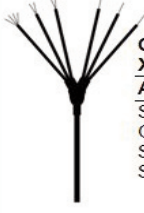
**Order Code: 11L**  
**X-Y-Z-Axis**

	Accelerometer	Gyroscope
Supply +	Signal +	Signal +
GND	Signal -	




**Order Code: 14L2**  
**X-Axes Y-Z-Axis X-Y-Z-Axis**

	Accelerometer	Accelerometer	Gyroscope
Supply +	Signal +		Signal +
GND	Signal -		GND
Signal +			
Signal -			



**Order Code: 11L2**  
**X-Axes Y-Z-Axis X-Y-Z-Axis**

	Accelerometer	Accelerometer	Gyroscope
Supply +	Signal +		Signal +
GND	Signal -		
Signal +			
Signal -			



**Order Code: 14L3 - BNC - Banana**  
**X-Y-Z-Axis**

	Accelerometer	Gyroscope
Supply +	Signal +	Signal +
GND	Signal -	GND
Shield		

Standard wiring (11L) included  
Special wiring available at extra cost

## ASC IMU 7.X.Y

### FACTORY CALIBRATION

#### ASC ACCELEROMETERS LN-SERIES

Measurement Range	2g and 5g	10g	25g	50g
Sensitivity	5m/s <sup>2</sup> @16Hz	50m/s <sup>2</sup> @80Hz	100m/s <sup>2</sup> @80Hz	200m/s <sup>2</sup> @80Hz
Frequency Response	1 to 100Hz	10 to 300Hz	10 to 500Hz	10 to 650Hz

#### ASC ACCELEROMETERS MF-SERIES

Measurement Range	2g and 5g	10g	30g	50g
Sensitivity	5m/s <sup>2</sup> @16Hz	50m/s <sup>2</sup> @80Hz	100m/s <sup>2</sup> @80Hz	200m/s <sup>2</sup> @80Hz
Frequency Response	1 to 100Hz	10 to 1400Hz	10 to 1600Hz	10 to 1800Hz

Conversion Factor: 1g corresponds to 9,80665 m/s<sup>2</sup>

#### ASC MEMS GYROSCOPES

Measurement Range	75°/s	150°/s	300°/s	900°/s
Sensitivity	35°/s@16Hz	75°/s@16Hz	150°/s@16Hz	150°/s@16Hz
Frequency Response	10Hz to 100Hz	10Hz to 100Hz	10Hz to 100Hz	10Hz to 100Hz

A factory calibration certificate is provided with each axis. Sensitivity over the measurement range and non-linearity data are provided in the calibration certificate.

#### DAKKS-CALIBRATION DIN ISO 17025 (ORDER SEPARATELY)

A calibration certificate accredited by the German accreditation body (Deutsche Akkreditierungsstelle, DAkkS) is possible. The DAkkS certificates are internationally accepted, e.g. by the European cooperation for Accreditation (EA) and the International Accreditation Cooperation (ILAC).

### ORDERING INFORMATION

	Accelerometer		Gyroscope	Cable Length	Connector
	Measurement Range (g)	LN or MF	Measurement Range (°/s)	in Meters	A: No Connector L3: Cable Switch
	XXX	LN or MF	YYY	Z	
ASC IMU 7	002	LN	150	3	

Ex: ASC IMU 7.002LN.150-3A

Contact ASC for individual requirements, cable length and customised connectors.

### QUALITY

- ▶ ASC GmbH is ISO 9001:2015 certified.
- ▶ The Deutsche Akkreditierungsstelle GmbH (DAkkS) has awarded to our calibration laboratory the DIN EN ISO/IEC 17025:2005 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.