



# AC-7x Force Balance Accelerometer

## Overview

The AC-73 sensor package is a true electro-mechanical triaxial downhole accelerometer designed for broadband earthquake monitoring and applications requiring highly sensitive and rugged sensors with minimum maintenance and a simple method for periodic testing.

The rugged mass suspension moving coil system improves the signal to noise ratio. The magnetic system and capacitive position sensors offer symmetrical controls for the accurate electronic centring of the mass. At rest the accelerometer mechanism is in balance and no electrical output is generated.

In case of a ground motion, AC-73 yields an electrical output proportional to the current used to keep the mass centred. This output signal is precisely calibrated to provide a signal at the utmost accuracy and with a lowest possible noise level. The symmetrical positioning system incorporated with the force balance accelerometer principle, the accelerometer faithfully keeps its scaling and calibration even under extreme conditions.

The DC response allows the sensor to be easily repaired, tilt tested or recalibrated in the field. With the help of the test line the AC-73 accelerometer can be completely tested assuring proper operation and accurate acceleration measurement. This test line is internally connected to the external world only when a given command is sent to the sensor to avoid any noise pick-up through the test input.



## Key Features

- ▶ True electro-mechanical force balance accelerometer
- ▶ Digital AC-73D version available
- ▶ Dynamic range 165 dB
- ▶ User selectable full scale range:  $\pm 0.5, 1, 2, 3$  or 4 g
- ▶ Bandwidth from DC to 200 Hz
- ▶ Exemplary offset stability
- ▶ Temperature and drift compensation
- ▶ Robust suspension system
- ▶ Single bolt mounted enclosure with up to  $\pm 10^\circ$  of levelling adjustment
- ▶ Integrated bubble level

The AC-73 is equipped with electronic offset adjustment features that make its installation very user friendly. This powerful feature allows the users to install the AC-73 without mechanical offset adjustment and fine levelling.

The sensor can be powered from 9.5 to 18 VDC source with the advantage that its power input is insulated from the sensor's electronic ground. This avoids ground loops and reduces noise induced through the power supply.

All the best features of the analog AC-73 accelerometers are now offered with the new AC-73D version, having a digital interface that is directly compatible to operate with the GMSplusD series recorders with up to 1,000 meter distances using standard Cat5e cables, providing an extremely compact and versatile measuring solution.

# AC-7x Force Balance Accelerometer

## Specifications

### General Characteristics

Versions: AC-7x: analog  
AC-7xD: digital

### Configurations\*\*\*:

	Triaxial	Biaxial	Uni-axial	Axes	Alignment**
AC-73 or AC-73i*:	■			X - Y - Z	H - H - V
AC-72-H or AC-72i-H*:		■		X - Y	H - H
AC-72-HV or AC-72i-HV*:		■		X - Z	H - V
AC-71-H or AC-71i-H*:			■	X	H
AC-71-V or AC-71i-V*:			■	Z	V

\* i : Internal sensor \*\* H: Horizontal, V: Vertical  
\*\*\*: add "D" after number of channels for digital version

Full scale range: ±2 std., ± 0.5, 1, 3 or 4 g  
user selectable at field

### Sensor Element

Type: True electro-mechanical force balance accelerometer

Dynamic range: 165 dB (per bin rel. full range)  
156 dB (per bin rel. full scale rms)  
134 dB (0.02 - 50 Hz, integrated PSD)

Nonlinearity: < 0.1 %

Accuracy: ±0.4 dB max over the bandwidth

Cross axis sensitivity: < 0.5 %

Bandwidth: DC to 200 Hz

Damping: 0.7 ±0.1 critical

Offset drift: 0.0005 g / °C

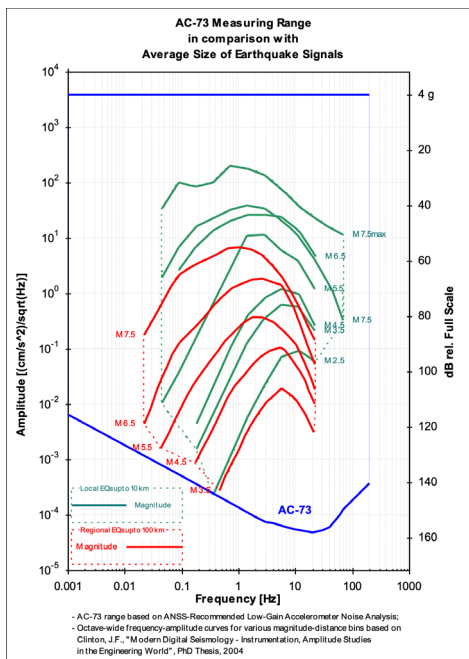
Span drift: 200 ppm / °C

Full scale output<sup>NAD</sup>: ±10 V differential (20 Vpp)

Hysteresis: < 0.001 % of full scale

Sensitivity: 2.5 to 20 V/g

Output impedance: 47 Ω



### Ordering Information

Specify: Version and configuration of AC-7x, full scale range, and other applicable options

[Link to AC-73 accelerometer response files in IRIS NRL library](#)

NAD: Not applicable for AC-7xD digital version.

### Power

Supply voltage: AC-7x: 9.5 to 18 VDC, single supply  
AC-7xD: 48 VDC

Consumption: AC-73: 41mA typical, 260 mA max.  
@15 VDC  
AC-73D: 200 mA typical

Overvoltage protection: All external interfaces are protected

### Connector Pin Configuration

AC-73:

Pin 1-2, 3-4, 5-6 Signal output for axis X, Y, Z

Pin 7-8 Test input, Digital 0/12 V / GND

Pin 9-10 12 VDC insulated power supply input

Pin 11-12 Reserved

Case Shield connection

AC-73D: see user manual

### Environment/Housing

Housing type: Cast aluminium  
Sealed access cover

Housing size: 195 x 112 x 95 mm

Weight: 3.0 kg

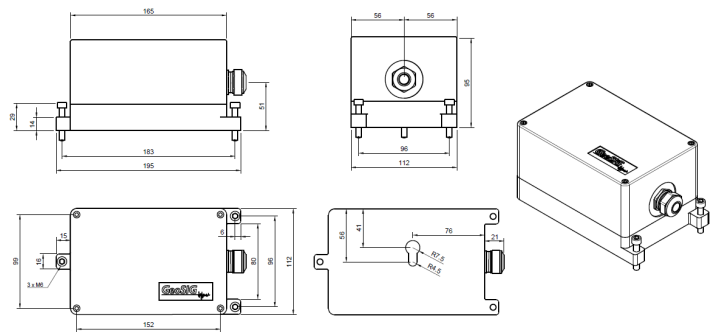
Index of protection: IP 65  
optional IP 68<sup>NAD</sup>

Temperature range: -20 to +70 °C (operating)  
-40 to +75 °C (non-operating)

Humidity: 0 to 100 % (non-condensing)

Orientation: Can be configured for mounting in any position (please specify at order).

Mounting: Single bolt, surface mount, adjustable within ±10°



### Standard sensor

Floor mounted, full scale ± 2 g, for external sensors: concrete anchor, GeoSIG recorder mating connector and  
AC-7x: 2 m cable with cable inlet  
AC-7xD: cable inlet

### Options

Full scale output<sup>NAD</sup>: - 4 to 20 mA current loop

Cable & connector<sup>NAD</sup>: - Frame connector (no cable inlet)  
- Mating connector (for frame connector)  
- Cable with shielded twisted pairs for any length with open end  
- Connector on user specification mounted at cable end  
- See separate cable & connector options sheet

Housing: - Watertight IP68 housing<sup>NAD</sup>  
- Stainless steel protective housing

Mounting: - See separate sensor orientation options sheet