



# User Manual

## AC-43



<b>Author:</b>	Serge Rudaz
<b>Checked:</b>	Talhan Biro
<b>Approved:</b>	Johannes Grob
<b>Distribution:</b>	GeoSIG Ltd (1), Customer on request

## Document Revision

Version	Date	Modification	Prepared	Checked	Released
1	12.02.2007	Adapted to new sensor housing; File name and title change	SER	TAB	JOG
2	25.02.2008	Updated with DH version	SER	TAB	JOG
3	23.09.2013	Axis orientation	JLT	MAE	JOG
4	06.06.2014	New logo	VAG		
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6	24.02.2022	Housing drawing updated	KEC	ALB	
7	04.08.2022	Updated chapter 2, electrical connector Changed chapter order; updated doc revision table	ALM	ALB	KEC
8	21.02.2022	Removed AC-4X references; Removed downhole option and instructions	KEC	BES	VAG
9	03.03.2022	Updated electrical connector details & photos	KEC	ALB	VAG

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## Warnings and Safety



*The sensor housing provides no protection against explosive atmosphere. It must not be directly operated in area where explosive gases are present; contact GeoSIG for this kind of special application.*

## 1. Basic Specifications

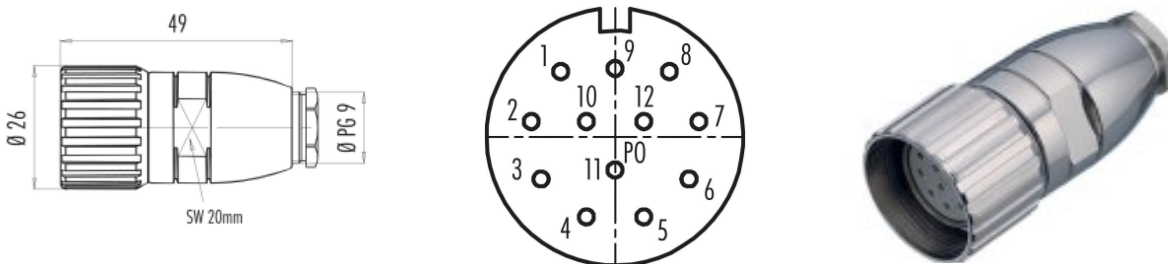
Sensor Series	AC-43
Input range	Acceleration, $\pm 0.625$ , $\pm 1$ , $\pm 2$ , $\pm 3$ , $\pm 4$ or $\pm 5$ g
Output range	$0 \pm 10$ Volt differential output
Frequency range	From DC to 100 Hz
Protections	All connectors pins are protected by TransZorb diodes and VDR
Power supply	7 - 15 VDC
Current drain	Average 74.1 mA @ 15 VDC

## 2. Electrical Connector

All AC-43 accelerometers are supplied as standard with a 2 m connection cable. Based on the intended use, the 12-pin metallic-style connectors will be supplied in one of the following options: Binder Series 623 or Binder Serie 423.

### 2.1. Binder Serie 623

GeoSIG	P/N #J_CIR.012.002.F
Binder Serie 623	P/N 99 4606 00 12

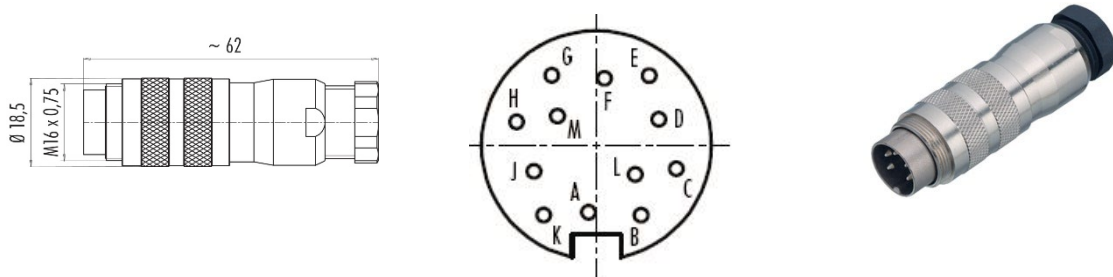


**Figure 1, Binder Serie 623 Connector**

The cable gland nut is determined according to cable external diameter, and it must be ordered separately. The cable gland nut must also provide the cable shield connection to the connector case.

## 2.2. Binder Serie 423

GeoSIG	P/N #J_CIR.012.010.M
Binder Serie 423	P/N 99 5629 00 12



**Figure 2, Binder Serie 423 Connector**

The cable gland nut is determined according to cable external diameter, and it must be ordered separately. The cable gland nut must also provide the cable shield connection to the connector case.

## 2.3. Connector Pin Description

The connector pin assignment and cable colour code can be observed in the table below:

Binder Connector		SIGNAL	Comment	Colour	
Serie 623	Serie 423			White	
Pinout	Pinout				
1	A	OUTPUT X (+)	0 V ± 5 V voltage output, 47 Ω output impedance	White	
2	B	OUTPUT X (-)	0 V ± 5 V voltage output inverted, 47 Ω output impedance	Brown	
3	C	OUTPUT Y (+)	0 V ± 5 V voltage output, 47 Ω output impedance	Green	
4	D	OUTPUT Y (-)	0 V ± 5 V voltage output inverted, 47 Ω output impedance	Yellow	
5	E	OUTPUT Z (+)	0 V ± 5 V voltage output, 47 Ω output impedance	Grey	
6	F	OUTPUT Z (-)	0 V ± 5 V voltage output inverted, 47 Ω output impedance	Pink	
7	G	TEST INPUT	Test input, output will result in a sensor step response	Blue	
8	H	GND	Connected to Recorder's GND	Red	
9	J	+12 VDC power	Power input, +7 to +15 VDC range, 74.1 mA @ 15 VDC	Black	
10	K	GROUND	Ground, not connected to mechanical ground	Violet	
11	L	AUX	Auxiliary input (reserved)	Grey/Pink	
12	M	GROUND	Ground, not connected to mechanical ground	Red/Blue	

**Table 1. AC-43 Connector Pin Assignment and Cable Colour Code**

### 3. Mounting



Figure 3, AC-43 housing

Small size and single bolt attachment allow the AC-43 to be easily installed, saving installation time. Levelling is accomplished via three-point levelling screws.

 **Do not overtighten the three-point levelling mechanism. This may damage the sensor.**

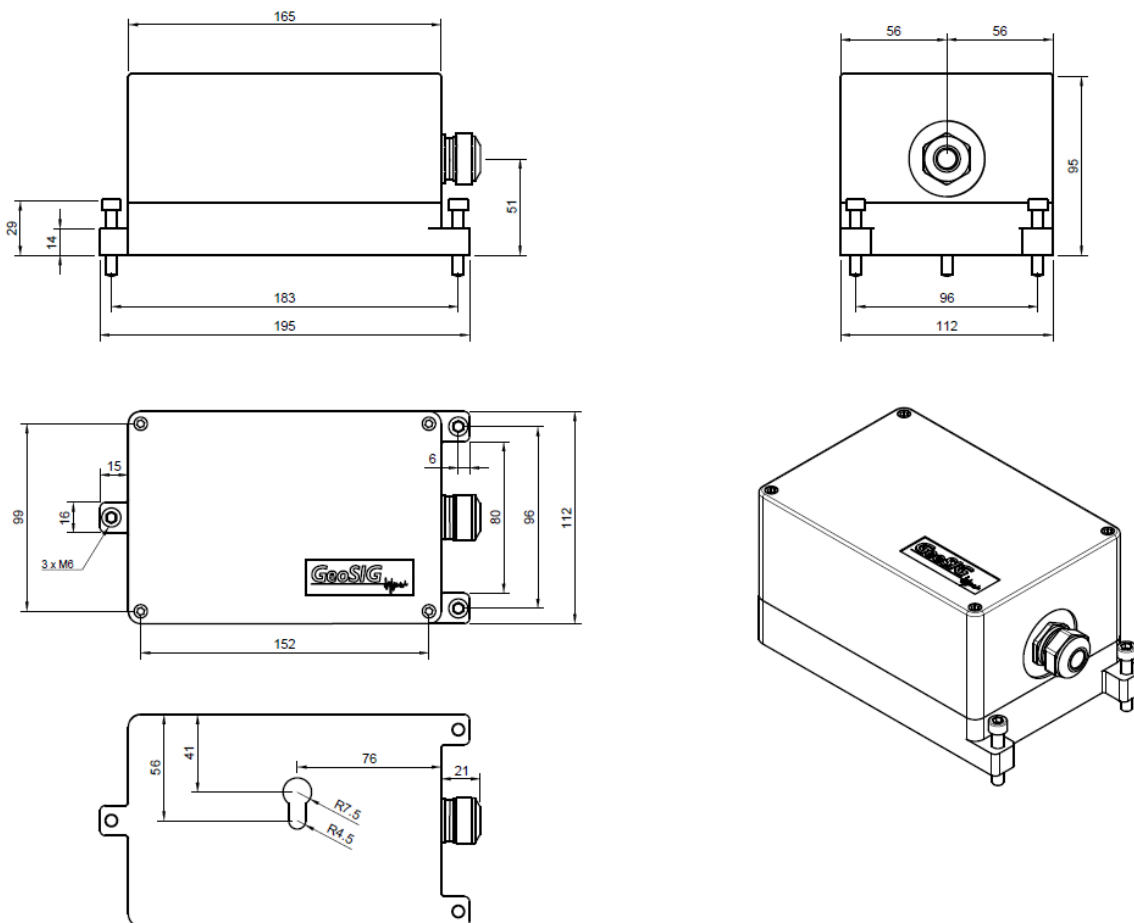


Figure 4, Sensor housing dimensions

The accelerometers must be firmly mounted to a surface and levelled, as the application requires. Check to ensure that the accelerometer is aligned to produce the desired output signals. Acceleration in the direction indicated on the case will produce a positive output signal. The orientation definitions as shipped are: X = East, Y = North, and Z = Vertical (Up).

The accelerometer has single-bolt, 3-feet-levelling mechanism.

The surface should have a scribed north/south orientation line accurately surveyed from reliable markers. The X-axis of the sensor has to be pointed to East or to any other main direction of the structure to monitor. One M8 expanding nut rock anchor must be used for the sensor fixation.

## 4. Theory of Operation

### 4.1. Introduction

The **AC-43** sensor package is a triaxial accelerometer designed for free field and industrial applications regarding STRONG-MOTION earthquake survey, monitoring and research. This sensor is well suited for applications where a high sensitivity is required.

The AC-43 sensor can be optionally installed into a rugged protective housing of stainless steel for optimal environmental resistance. Optionally, the protective housing could be executed with an IP68 grade in circumstances where it is possible that the housing might become submerged in the free field location.

The sensor could be installed on either floor / ceiling or on the wall with a modification of the axis configuration. With the help of the **TEST LINE**, the complete sensor can be very easily and fully tested. Full scale can be field selected by the user with jumpers.

### 4.2. Principle

The AC-43 accelerometer is based on the modern MEMS (Micro Electro-Mechanical Systems) technology, consisting of sensing cells assembled in a way that optimises their performances. This, combined with the state-of-the-art proprietary circuit design, yields this cost effective and reliable accelerometer.

MEMS cells include linear accelerometer sensing elements, which measure the capacitance variation in response to any movement or inclination, and a factory-trimmed interface chip that converts the capacitance variations into analog or digital signal proportional to the motion.

The DC response allows the sensor to be easily repaired, tilt tested or recalibrated. With the help of the TEST LINE, the AC-43 accelerometer can be completely tested, assuring proper operation.

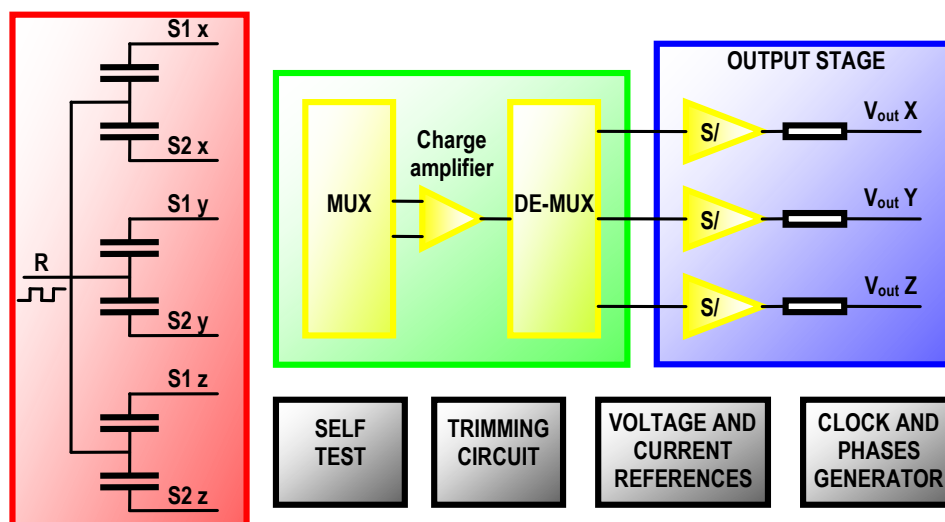


Figure 5, AC-43 Sensor block diagram

The test signal will move the seismic mass. The movement of the mass generates a voltage across the position detector, which is detected by the differential charge amplifier and induces an output signal.