KEY FEATURES

- Triaxial MEMS accelerometer
- 4-20mA or 0.5 to 4.5V Output
- -40 to +85°C
- IP67 protection
- Ranges +/-2g to +/-16g
- Self-test function

APPLICATIONS

- Bridge-strike monitoring
- Machine control
- Structural Monitoring
- Low frequency vibration monitoring
- Motion measurements

Description/Application information

The AS1 Series Accelerometer is a versatile analogue DC accelerometer with 4-20mA or 0.5 to 4.5V output. Using a low-noise Monocrystalline silicon capacitive micromachined sensing element, the signal is internally compensated for linearity and long-term stability. Low power consumption and EMC/RFI shielded makes this a versatile and affordable accelerometer for many varied applications.

Available in ranges from ±2g to ±16g and analogue output, this DC coupled accelerometer has a frequency range from 0Hz to 200Hz.

The AS1 has a rugged plastic body with M6 brass screw fixings and incorporates a shielded PUR cable, IP67 protected for maximum durability. The accelerometer includes a self-test function for verification of sensor integrity.

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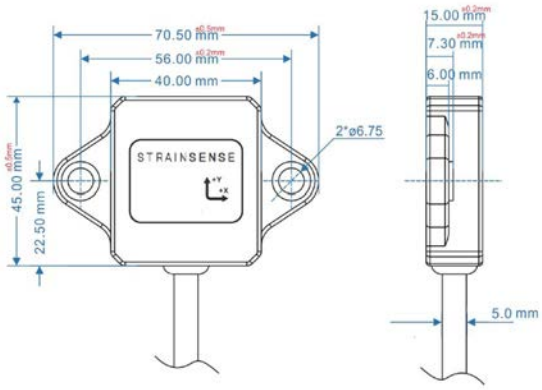
Dimensions



Drawing is not to scale. For 3D model or CAD information please speak to our Sales team.

Recommended mounting.

- Ensure the sensor is firmly mounted to the surface.
- Ideal surfaces are metal or concrete. Soft surfaces may reduce the effectiveness of the accelerometer as they can act as a vibration damper.
- The sensor should be mounted to a flat surface to ensure best performance.
- The sensor can be mounted in any direction however the X,Y,Z axis will always correspond to the above diagram.

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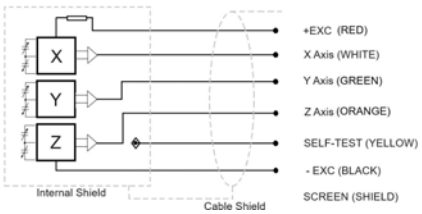
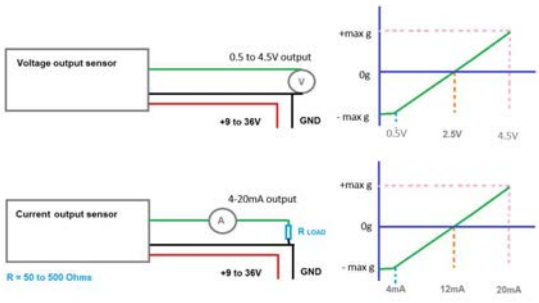
Electrical Connection



The electrical connections shown are the same whether the output is 4-20mA or 0.5 to 4.5V
Please see the below diagrams for connection to your acquisition device.



Notes: For the 4-20mA output version, the power supply requirement must deliver a minimum of 85mA.

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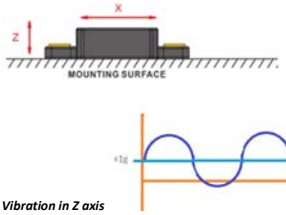
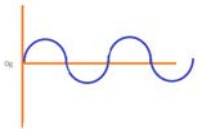
Example vibration analysis



Vibration in Z axis

Please note that whichever axis is in the Z direction (same direction as gravity) will measure gravity also. This will show as a 1g offset in the sensor output. If the sensor is "turned over" the reading for gravity will reverse (-1g) this phenomenon can be used as a simple function test of the sensor for all axes.



Vibration in X or Y axis

Note, when the vibration is not affected by gravity there is no offset

To enable a complete 3D vibration analysis all 3 axes need to be considered. The proportion of vibration in each direction can be combined mathematically to see the overall vibration of the subject.

Velocity calculations.
Your acquisition device may be able to calculate the velocity of the subject. This is done by integrating the vibration signal over time. This will give you the velocity value.

Displacement calculations.
Your acquisition device may be able to calculate the displacement of the subject. This is done by double-integrating the vibration signal over time. You will then know the displacement of the subject.

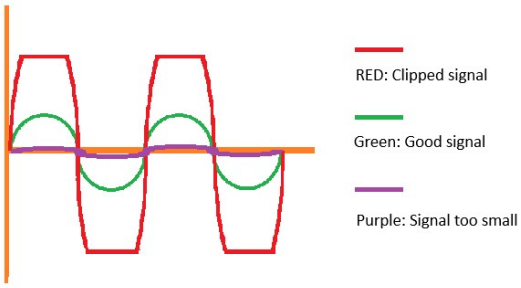
Please note: When calculating vibration, velocity or displacement, the spectral noise of the sensor needs to be considered as an uncertainty of the final value. For accurate values a lower noise accelerometer may be required. This accelerometer model is designed as an entry model and therefore may have more noise than a precision model.

Choice of sensitivity.

Care needs to be taken when choosing the sensitivity of your accelerometer.
The accelerometer range is given in "g" which equates to g-force or gravity this is typically 9.8m/s^2.
When looking for small and low frequency vibrations a low-g range will suffice. However if you want to monitor higher frequencies or large movements, a higher range may be needed.
For example: a low-g application may be monitoring floor vibrations in a building, but a higher-g application may be monitoring the movement of a wheel hub on a vehicle travelling on a bumpy road as the movement is much faster even though the displacement may be small; this creates a higher-g level. A much higher-g application may be an impact test or an explosion. This accelerometer is not suitable for very high-g applications.
The basic formula is as follows

$$\text{g-force} = \frac{(2\pi f)^2 \cdot x}{9.81}$$

where f is the frequency in Hz, x is the displacement in Metres.



If you choose an accelerometer with a range that is too low, the output will reach the maximum and "clip" causing loss of data.

If you choose an accelerometer with a range that is too high, you will get a very small data trace. It is possible to "amplify" this information in your acquisition device but you will also be amplifying the noise that the sensor and electrical connections have causing loss of clarity of the signal.

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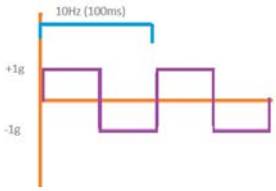
Self-test

The accelerometer has a self-test mode. This is triggered by connecting the ST wire to ground.
Note: The ST wire should not be connected to anything for normal operation.

When grounding the ST wire, all 3 channels will exhibit a ±1g square wave signal on the output.
During the ST mode the sensor should not be exposed to vibrations. Any vibrations of the sensor during ST mode will be ignored and not form any part of the sensor output.



The Self-test output is designed as a square wave to differentiate the signal shape from a normal vibration which would take the form of a sine wave.

Materials

- Main body: Formed Nylon based plastic
- Internals: fully potted with proprietary compound
- Fixing lugs: Brass
- Cable: PUR sheathed with 5mm diameter

No connectors are supplied as standard however for connector options please contact our sales team.

The product is fully RoHS compliant.
Please adhere to WEEE directives when disposing of this product.

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Advisory Items.

Output choice:
When choosing the output of your sensor, please be aware that the voltage output is not suitable for long cable runs. For cables longer than 3 metres we recommend using the 4-20mA output. The 4-20mA output signal does not get affected by the resistance of the cable.

Cable:
These accelerometers all come with a PUR sheathed cable. This can be supplied in a range of lengths (standard length is 3 metres).

Mounting:
Secure and careful mounting is recommended as per the recommendations on Page 2. Mis-alignment will result in reduced performance.
Recommended mounting is using an m6 threaded screw or stud.

Case material:
The standard case material is made from Nylon moulded plastic. The internals are fully potted and are non serviceable.

IP Rating:
Standard IP rating is IP67 which is suitable for submersion for up to 30 minutes at a depth of 1 metre. Longer submersion is not recommended. IP67 is chosen for its capability to withstand weather changes, the plastic case material is designed to be durable for a long service-lifespan

MTBF:
We state a conservative MTBF of 50000 hours, however these sensors will last for many years longer if installed correctly and used in the manner to which they are designed.

Disposal:
Please recycle this product responsibly

for further WEEE information please contact our sales team.

RoHS:
This product is fully RoHS compliant

More information:

For more information visit our website

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MEMS Triaxial Current Accelerometer
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