

Introduction

The following data sheet summarises the technical specification for the **Model M5210-X** range of motion sensors. The M5210-X motion sensor is a solid state low noise device capable of monitoring low frequency movements on fixed structures for both static and dynamic applications. The low thermal drift enables the unit to report static drift over long periods of time. The instrument uses low noise accelerometers to make physical measurements.

Measurement Axis	Options for 1 - 3 axis
Frequency response	0 to (-3dB 18Hz)
High shock durability	(20000 g)
Range	0.1 - 2.0 m
Operating Voltage	12 V DC
Storage temperature	- 55 °C to +125 °C
Operating temperature	- 40 °C to +80 °C
0.001° resolution	(10 Hz BW, analog output)
RoHS compliant	
Voltage Output	± 5V, 0 - 2.5 V DC
Options for	SDI-12 Digital Port
Excellent stability over temperature and time	



Model 52102

Operations

The motion sensor provides an output signal proportional to acceleration in the specified directions of motion and this is supplied as an analogue output for direct connection to a data acquisition system or via an SDI-12 port for connection to a logger unit.

The sensor outputs have been optimised to connect directly on to a Keynes Controls data acquisition system using the standard voltage input channels or onto an SDI-12 based logger unit for remote recording operations. After the data acquisition system has made a reading the new data values are passed to the integration software via the standard instrument driver for processing.

The Integration software filters the input signals to remove any offset and noise below 0.05 Hz (Constant offset) and above 5 Hz. The instrument uses over-sampling and filtering to remove out of band noise. The acceleration signal output from the sensors are then integrated to convert them first to velocity and then again to displacement. At each stage of the processing the constant of integration is removed by the filtering action to prevent the resultant signal from ramping to infinity.

Vector Magnitude - Measurement

The 5210-X range of sensors offers options for 1, 2 and 3 degree of freedom and offers output signals simultaneously to a data acquisition system. When used with the Keynes Control NetPod series instruments true vector magnitude displacement results can be obtained.

The NetPod range of data acquisition systems offer full synchronised measurements with interface cards containing signal conditioning, anti-alias filters, digital anti-alias and lightning protection in a single unit. There are no phase delay through the filters or sampling delay caused by multiplexers when undertaking a measurement.

As the displacement of a body/structure is made in perpendicular axis simultaneously then true vector magnitude and direction can be determined using simple vector mechanics. and this can be obtained as part of the driver

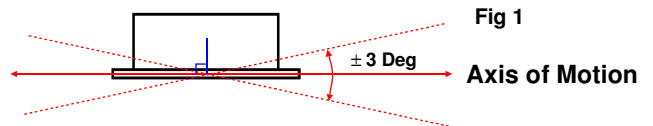
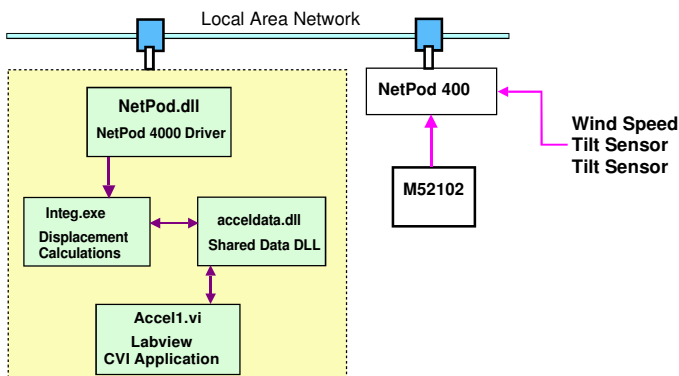


Fig 1

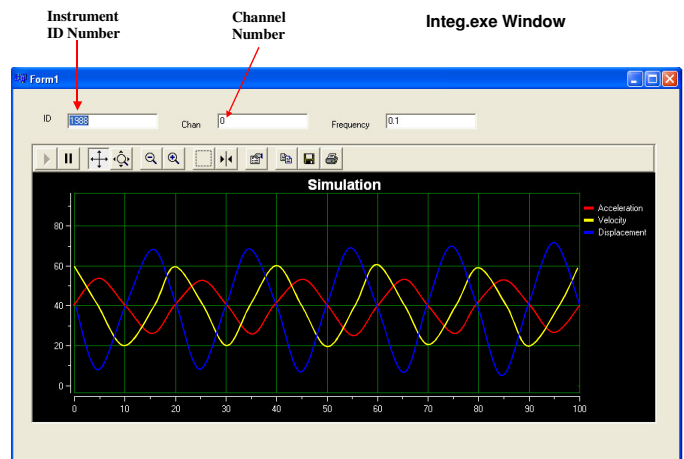
Typical Application

The majority of the energy implied into an offshore structure is wave motion and to a lesser amount the wind. For this reason keynes set the high pass filter at 0.05 Hz as this is just the wave frequency and 5 Hz as this is above any wind forcing effect.



Host Data Analysis PC

Care should be taken to ensure that the input signals are free from noise and that all Earth terminations are undertaken correctly. Any noise below 1 Hz during the integration process will have magnifying effect upon the whole result. Note.



Part Numbers

Model selection 5210-X where x = 1 - 3 depending upon number of axis to be measured

Component Parts

The following parts are supplied as part of the M5210-X sensor kit.

- 1 x IP54 ABS Enclosure
- 4 x 5 mm mounting bolts (Counter sunk)
- 4 x 5 mm locking washers
- 4 x 5 mm knuts
- 2 x 5 way connectors - cable terminators CA-1 & CA-2
- 1 x Waterproof cable gland

Power Supply

The M5210-x requires 12V DC at 10 mA for reliable operation

Safety Precautions

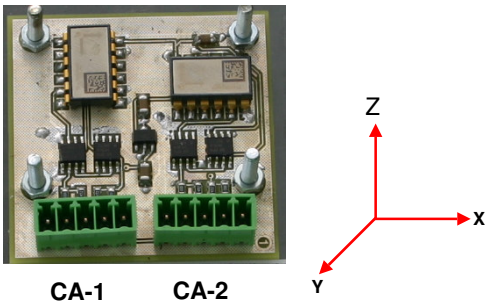


Image shows the Connectors CA-1 and CA-2 within the sensor

Cable Specification & Installation

The M52102 unit is a low power device and as such only allows direct connection to cables of conductor diameter 1.5 - 3 mm.

For best operation the cable length from the sensor to the data acquisition system should be kept to a minimum. Shielded cable will offer the best protection to environmental noise and should be terminated at the main instrument earth.

SDI-12 Operation

The SDI-12 option provides digital output from the sensor to a suitable logger or interface unit. Data is not simultaneously sampled from the sensors but is suitable for local precise monitoring applications

Calibration

The M52102 has been factory calibrated. When deployed with the Keynes NetPod 4000 unit the calibration factors are built directly into the instrument.

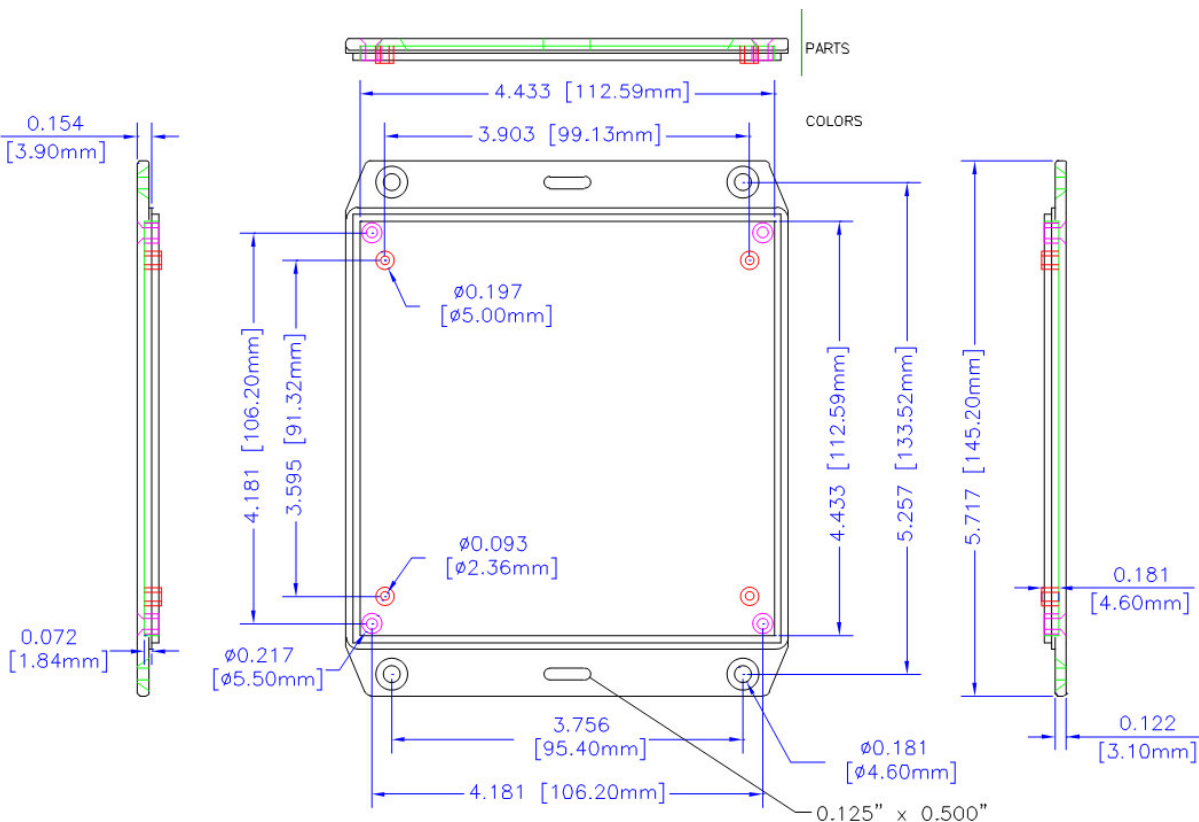
The sensor should be re-calibrated within approximately 18 months to maintain systems accuracy.

Mounting Instructions

The M5210-X sensor has to be mounted as level as is practically possible in the direction of motion to be measured. Some allowance for error has been allowed in the system design and so long as the sensor is within 3 degrees of the plane of motion then the results will be satisfactory.

Engineering Drawings

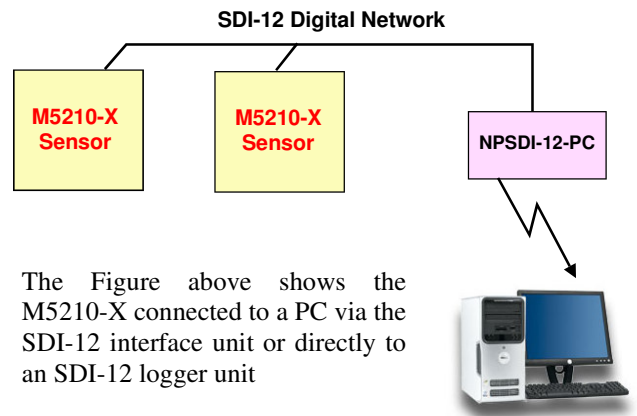
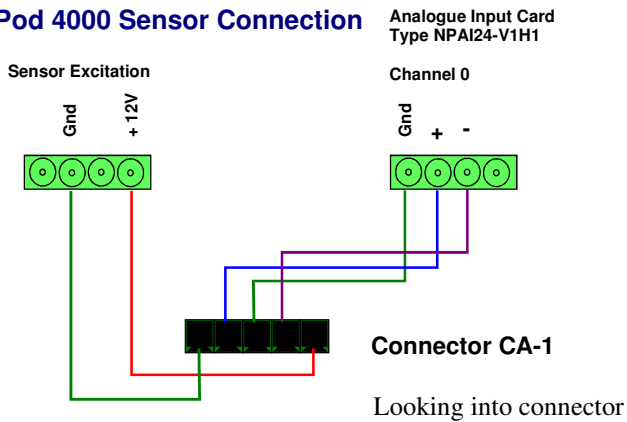
The following drawings show the dimensions of the M52102 enclosure and are accurate at the time of publishing. Take care when fitting the M52102 and only use the cable type specified.



Motion Sensor - Connection to NetPod 4000 Unit

The following circuit diagram shows how to connection the M5210-X sensor to the NetPod instruments. The power to drive the motion sensor is taken from the NetPod 4000/4003 and becomes active the instant that the instrument is powered on.

NetPod 4000 Sensor Connection



For true vector magnitude measurements or when the reading are to be synchronised to other sensor readings then the NetPod range of instruments should be used.



NetPod 4003



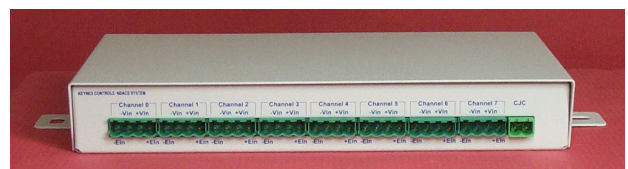
NetPod 4000

Internet Access / Web Based Logging

For applications where stand-alone remote systems need to be deployed then the best solution is to use the Keynes Controls NDACS6000 family of loggers and the analogue output version of the M5210-X sensor interface.

The NDACS 6000 supports remote access via a web browser and fully automated reporting via e-mail using both standard dial-up modem, Mobile phone and high speed Internet access.

The NDACS 6000 supports options to 1 million records on two independently programmable loggers as well as event capture and reports for both static and dynamic applications.



24 Bit Analogue Inputs
1 million Record Storage
Automatic Data Reports
Web Access
Full Remote Configuration & Download