Termination – Integral cables and cable assemblies will usually be supplied with prepared ends to allow connection to on-line data systems, switchboxes or the user's own connector. On request, a connector can be provided at the cable end suitable for connection to a portable signal analyser, this is most frequently a BNC plug. Contact Monitran for options and prices.

Cable Types – High quality cable is essential to get the best performance from these accelerometers. The cables used are:

- For general-purpose accelerometers – twin-core, shielded, ETFE insulated and stainless steel overbraided.
- For 1135, low profile accelerometer – single-core, ETFE insulated and stainless steel overbraided.
- For submersible accelerometers – three-core, polyurethane coated cable

Permissible Cable Length – In general vibration monitoring applications for industry, cable lengths of up to 1000m provide no problems when using low impedance cable, typically <150pF/m. As the length increases it is necessary to ensure that the power supply is of at least +24V and increase the current to 10mA. With careful parameter selection, lengths of up to 1000m will be possible with limited loss of signal. In many cases small losses will be unimportant as it is the change in vibration, rather than the absolute vibration, that is the important factor in assessing machine and bearing health.

Operating Environment – Standard accelerometers are stainless steel, all-welded construction and sealed for life with an IP rating of IP66 or IP67 making them immune to high-pressure water jets or occasional immersion for short periods. They are resistant to water, high humidity, oil, grease and most industrial chemicals. (Check chemical compatibility tables if in doubt.) They will operate reliably at continuous temperatures up to 140ºC.

Note that where temperature and moisture levels vary frequently for example in machinery with wide temperature cycles such as dryers and ovens it is wise to choose the accelerometer with the highest level of temperature and waterproofing. Contact Monitran for further advice on selection.

Submersible Accelerometers - Accelerometers with a "W" in their part number use a high pressure gland to seal around the integral waterproof cable. This makes them suitable for immersion down to depths of 100m and rated at IP68.

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Hazardous Areas - This series of accelerometers is strictly for use in non-hazardous areas. Monitran can provide a range of ATEX approved intrinsically safe accelerometers for hazardous area use.

Continuous Monitoring - DC output accelerometers are most useful for continuous monitoring providing a simple 4-20mA output ideal for use with PLC's or data systems. Monitran can provide a wide range of DC output accelerometers and also DIN rail mounted conditioners that will generate 4-20mA signals from the AC output of current controlled accelerometers.

Caution - Monitran uses its best efforts to ensure its products are fully fit for purpose and that any advice is appropriate to the intended use. The user is advised to ensure that all directions are adhered to and the principles of their operation and vibration measurement in general are fully understood. Our warranty terms are available on request.

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MONITRAN

General Operation and Installation Instructions for Monitran Current Driven AC Output Accelerometers

Introduction

These instructions refer to the MTN/1100 Series which is typical of this type of accelerometer. Please read these general instructions together with the datasheet for the specific accelerometer you are using such as the 1100S, 1100W, 1120I, 1130, 1140, 1135 and 1830.

These accelerometers are optimised for measuring vibration in rotating machinery such as bearings, motors, gearboxes, pumps, compressors, fans, paper and steel mills, machine tools etc.

Fig 1: A selection of top and side entry accelerometers with integral cable and screw connectors.

Principles of Operation

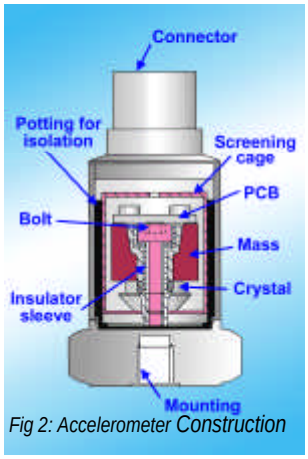

Fig 2: Accelerometer Construction

Inside the accelerometer housing a piezoelectric crystal is compressed between the base and a small weight called the seismic mass. When the accelerometer vibrates along its axis this arrangement applies an alternating force of compression and extension to the crystal. This vibration generates a minute, constantly changing electric charge proportional to the force and thus the acceleration. The entire accelerometer and electronics package is mounted within a screening cage to minimise the effects of external magnetic fields on the signals.

When a constant current power supply of +24VDC is applied this varying charge is amplified and converted to a usable alternating voltage. With appropriate instrumentation this data is used as a measure of the condition of the machinery on which the accelerometer is mounted. Most portable and on-line data loggers and frequency analysers provide this power when the measurement is made. For other applications, constant current power can be provided by our Auxiliary Power Supply (MTN/APSU01) or the circuit as shown below.

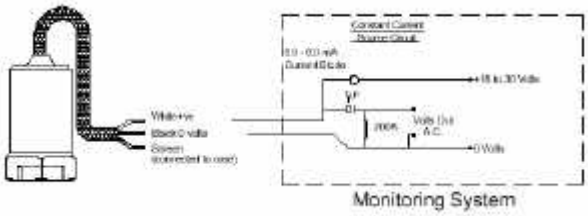

Fig 3: Constant Current Power Supply

The accelerometer responds only to vibration along its axis. Care should be taken to ensure that the sensitive axis is aligned with the direction of vibration. This is marked on the accelerometer on the opposite side to the serial number. However, the accelerometer can be mounted horizontally, vertically or at any angle between without affecting performance.

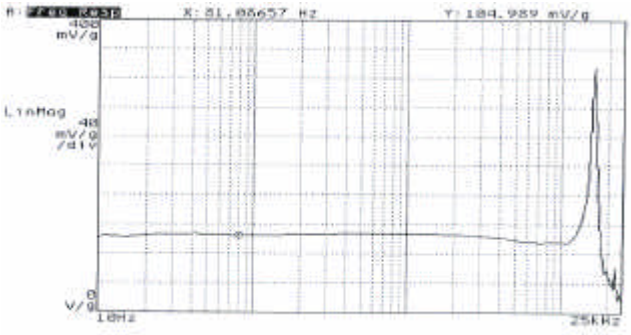

Fig 4: Typical Response Curve for MTN/1100

Mounting

The accelerometer must be firmly mounted on the machine so that vibration is correctly transmitted to the accelerometer. Loose mounting or bad surface preparation will give rise to resonance or loss of high frequency data. Fixing procedures are described later. The use of magnetic mounts or hand-held probes may result in some loss of very high frequency signals but this may not be significant for survey work.

Top entry 1100 series accelerometers are made in two general formats with either ¼"-28UNF or Quickfit female threads. This allows considerable versatility in mounting to the machine:

- Direct mounting using the ¼" female thread
- Using a variety of magnetic mounts with ¼" male thread
- Inserting a ¼" adaptor to M8, M10 etc
- Using a Quickfit male adaptor with an adhesive base
- Using a Quickfit male adaptor with a male thread: M8, M10, M12 or other thread

Fig 5: Accelerometer with Quickfit base showing adhesive and threaded adaptors

See the appropriate accelerometer datasheets. For magnetic mounts (DS0051) and for studs and adaptors (DS0027)

Surface preparation is very important. The mounting area should be faced at least 10% greater than the contact diameter of the accelerometer or adaptor and should be as smooth as possible. Datasheets DS.0090 and DS0092 describe how the mounting should be drilled and tapped for studs and adaptors; Datasheet DS0091 describes adhesive mounting which may be preferred when there is insufficient depth of material to take the length of stud required.

Suitable facing tools (MTN/MH001) and metal filled epoxy adhesive (MTN/MH010) are available from Monitran.

Side entry 1100 series accelerometers are secured with a ¼", M6 or M8 x 33mm bolt supplied with the accelerometer but still require a well prepared, flat surface.

Apply the correct torque as directed in the appropriate accelerometer datasheet. Over tightening may cause thread damage or shearing of the adhesive layer in adhesive mount accelerometers. Under tightening will give poor contact, anomalous readings and the accelerometer may work loose over long periods with high vibration.

Electrical

Cable or Connector Exit - In many models there is a choice of top or side entry. Side entry versions have a low profile and allow installation in spaces with restricted headroom. See the datasheets for options.

Connections - In most models, connection may be by either integral cable or a plug-in connector (2 pin Military Style 5015). The integral cable type is robust and economic and provides ingress protection to IP66 standard. This avoids the necessity to prepare connector and cable assemblies. For cable versions Quickfit mounting is preferred, see above. Connector versions are convenient when the accelerometer must be frequently removed from either its mounting or connection to the data system and therefore work well with an integral stud mounting, ¼", M8, M10 etc.

Wiring - Wiring details are supplied with all accelerometers on the Calibration Certificate. Observe the polarity of the signal wires when connecting. Most accelerometers use twin-core, shielded cables but some use a single-core and outer braid.

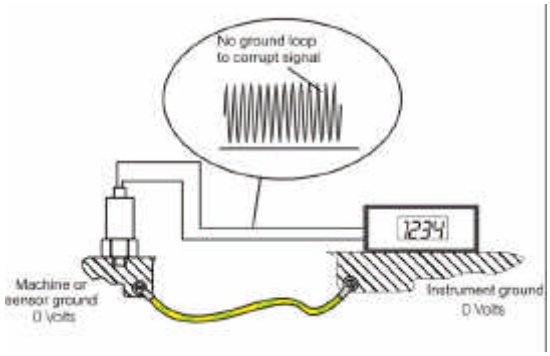

Fig 6: Eliminating ground loops

Grounding - In all AC accelerometers the case is isolated from the electronics and should be grounded to the machine. Where vibration analysis is to be performed on-line, ensure that the analyser shares the same ground. This arrangement will avoid ground loops and provide clean stable signals. Depending upon the electrical environment and measuring system the shield wire may be either connected to ground (0v, black) or left unconnected.

Cable anchorage

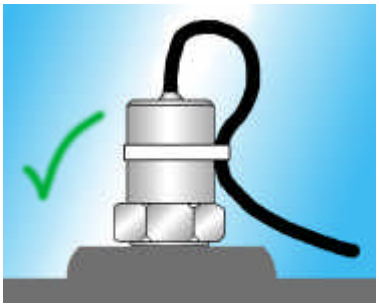

Fig 7: Removing connection strain by anchoring cable to the accelerometer body.

The cable should be fastened at suitable intervals to either a cable tray or convenient supports. This prevents accidental damage by personnel or moving machinery. To avoid excessive bending or axial thrust at the cable entry point or connector, loop the cable back and secure it to the accelerometer body with a tie-wrap.

Cable Routing – Monitran uses high quality shielded, twin-core cables wherever possible to protect the signals well from the effects of ambient electrical disturbances, these show negligible mains pick-up but careful cable routing will minimise potential interference. Avoid running signal cables close alongside AC power cables, radio transmission equipment, motors/ generators and other high current consumption devices. If cable must be extended or joined, ensure that the integrity of the shield is maintained across the join.