MILLTRONICS

SENACO AS100

Instruction Manual PL-562 January 2001

SENACO AS100

33455620
Rev. 2.1

Safety Guidelines

Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

Qualified Personnel

This device/system may only be set up and operated in conjunction with this manual. Qualified personnel are only authorized to install and operate this equipment in accordance with established safety practices and standards.

Warning: This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

Note: Always use product in accordance with specifications.

Contact SMPI Technical Publications at the following address:

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Specifications

Model

- standard: standard operating temperature range, Class II version available
- extended: extended operating temperature range, Class II version available

Power

- 20 to 30 V dc
- 18 mA typical

Operating Temperature

- standard:* -20 to 80 °C (-4 to 176 °F)
- extended:* -40 to 85 °C (-40 to 185°F)
- extended: -40 to 125°C (-40 to 257°F)

Relative Sensitivity

- 0.5% / °C of reading, average over the operating range

Output

- analog, 0.08 to 10 Vdc nominal, 100 KΩ minimum load impedance

Construction

- housing: 304 stainless steel

  303 stainless steel (hazardous rated version)
- cable: standard: 4 m (13 ft) cable, PVC jacketed, 3 twisted pairs, 24 AWG, shielded

  extended: 4 m (13 ft) cable, thermoplastic elastomer jacketed, 6 conductor, 24 AWG conductor, shielded

Ingress Protection

- IP 68 (waterproof)

* Class II versions available.

Weight

- 0.4 kg (1 lb.)

Approvals

- CE
- Available in hazardous version: CSA certified for Class II, Division 1 Groups E, F, and G

General Information

The Senaco AS100 Sensor

The Senaco AS100 Sensor monitors high frequency acoustic emissions (sound waves) generated by:

- the friction and impact of solids flow in pipes, chutes, and conveyors
- cavitation occurring in pumps, pipes, and valves
- turbulence of gases or liquids leaking through valves and flanges
- friction and jarring of mechanical parts

Acoustic emissions travel readily through solid materials such as metal, but are strongly attenuated when traveling through air. As such, the Sensor is immune to airborne interferences and provides a non-invasive method of monitoring process activities.

The sensor can be configured electrically during wiring to operate in either low or high sensitivity range mode. The high sensitivity range applies where highest signal levels vary up to 40 dB. The low sensitivity range applies where highest signal levels vary between 28 and 68 dB.

The Senaco AS100 Sensor provides an analog output for use with the Senaco Control Unit. The Sensor may be operated independently from the Control Unit by providing an external supply. The output is fed into a control panel, chart recorder, data logger, or programmable logic controller with a suitable input.

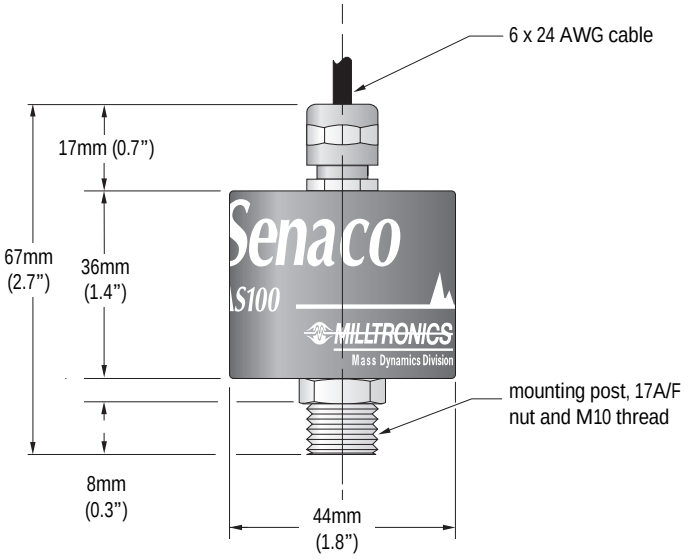
The Senaco AS100 Sensor is primarily used for solids flow detection. However, this device can be used in pump cavitation and fluid leak detection, provided sufficient noise levels are generated.

Features

- non-invasive
- screw in, bolt on, weld, or bond in place
- analog output
- high and low sensitivity range of operation

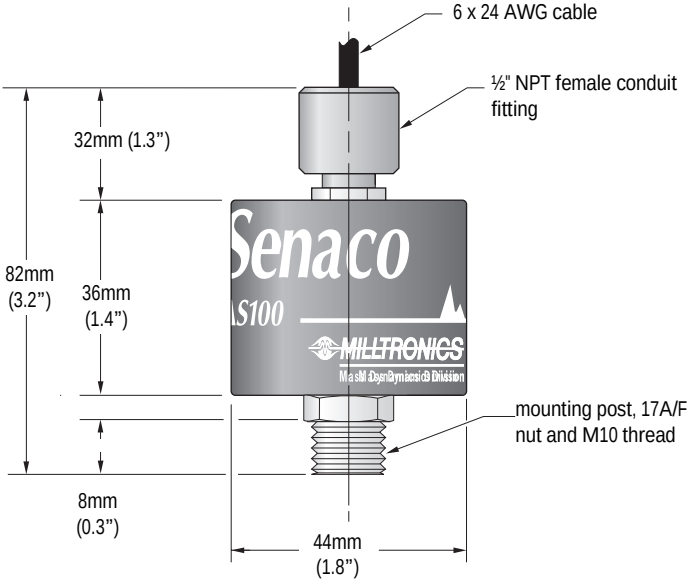
Outline and Dimensions

AS100 (ST and ET Versions)



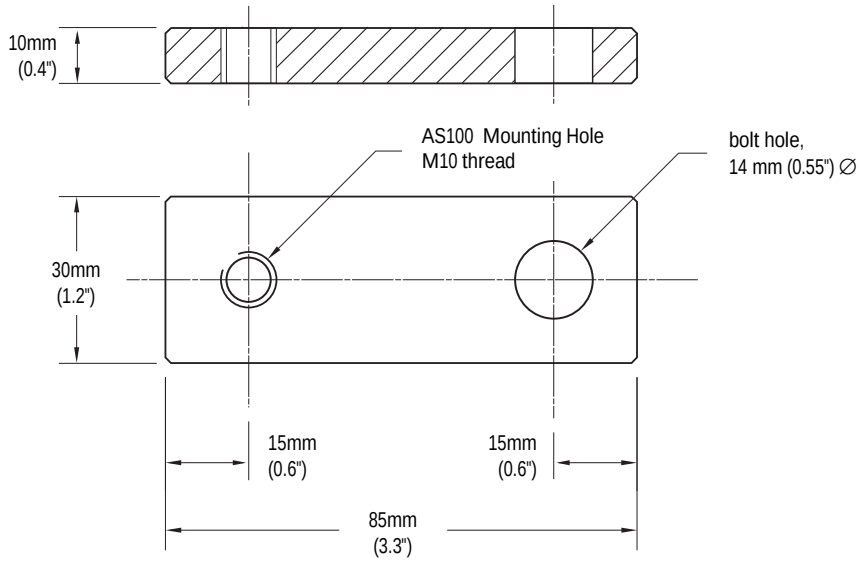
*dimensions are nominal

AS100 (Class II Rated ST and ET Versions)

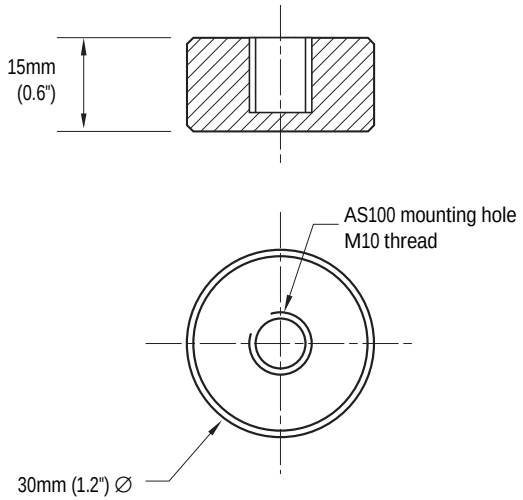


Accessories

Extension Tab (optional)



Mounting Disc (optional)



Note: Both Tab and Disc are 304SS.

Installation

Ideal Locations

- areas where the acoustic emission levels are highest and most consistent
- where the material impact is greatest
- areas closest to the point of leakage (e.g. valve body)
- closest point to source of cavitation (e.g. pump body)

Conditions to Avoid

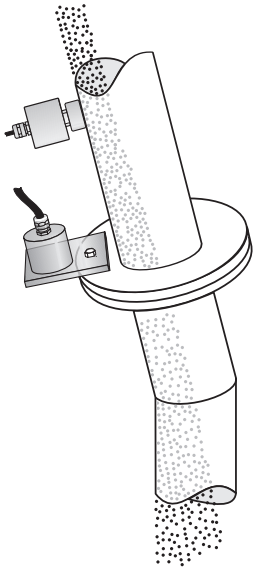
- non-metallic surfaces, as these tend to attenuate acoustic emission levels
- pipes with non-metallic liners as these tend to attenuate acoustic emission levels

Conditions to Consider

- joints and interfaces attenuate the acoustic emission levels.
- minimal temperature variation where acoustic emission levels are weak.
- location should provide sufficient response time in alarm or control circuit. e.g. loss of bearing lubrication, plug chute detection.

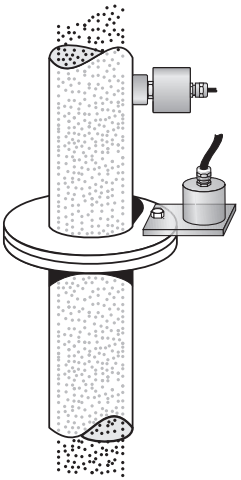
Solids Flow Sensing

Recommended



Good friction between product and piping. Mount Sensor on the upstream side of gasket for highest level of acoustic emission activity.

Not-Recommended



Minimal amount of acoustic emission activity due to limited friction between product and piping.

Mounting

Notes:

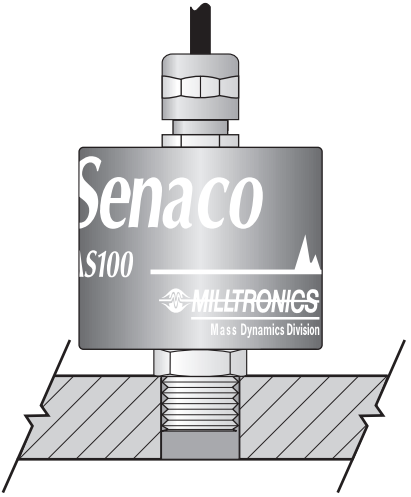
- To ensure the most ideal location, test the Senaco AS100 by clamping the Sensor to the application, and running a trial period to determine the system's performance. The acoustic emission level can be monitored by a voltmeter across the analog output. Refer to Interconnection on page 13.
- Coating the contact surfaces with grease enhances the propagation of acoustic emissions to the Sensor.

Mounting Method	Acoustic Coupling and Sensitivity
Clearance hole	Good
Drill and Tap	Good
Mounting Disc	Good
Extension Tab	Fair

Direct Mounting

Clearance Hole

Insert mounting post through hole in device being monitored and fasten with customer-supplied washers and nut.

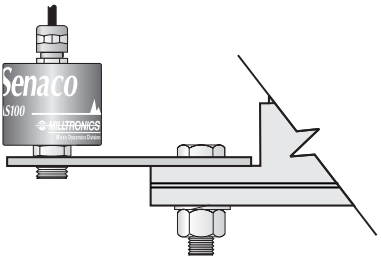


Drill and Tap

Screw mounting post into threaded hole in device being monitored.

Note: To ensure proper coupling, the face of the Sensor nut must be tight to the application surface.

Accessory Mounting



Extension Tab

Screw Sensor into threaded hole of tab, and fasten onto device being monitored.

Mounting Disc

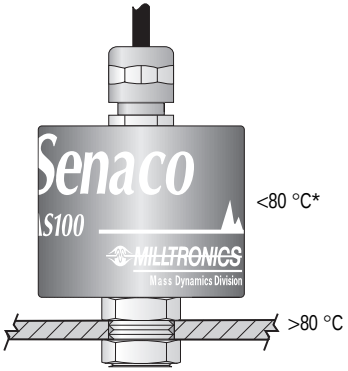
Screw Sensor into disc, after welding or bonding disc onto device being monitored.

Notes:

- If welding, weld must be a continuous bead. Tacking does not provide sufficient acoustical coupling.
- **Do not arc weld on equipent connected to an AS100. Remove the AS100 or disconnect electrically to avoid current flowing through the sensor.**
- If gluing, use Loctite 326 adhesive, or equivalent. Follow manufacturer's instructions to ensure proper adhesion.

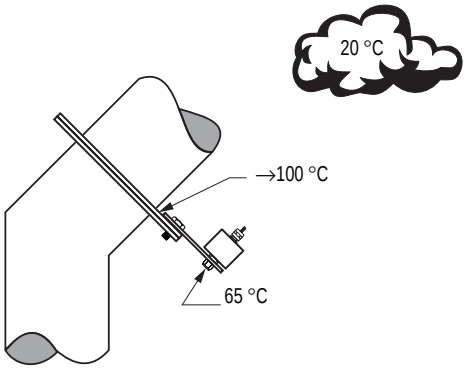
Temperature Considerations

Warning: Temperature at Sensor must not exceed minimum or maximum ratings.



Ensure adequate isolation from hot surfaces by providing additional spacing.

Note: for standard Temperature range model, maximum temperature is 80 °C.



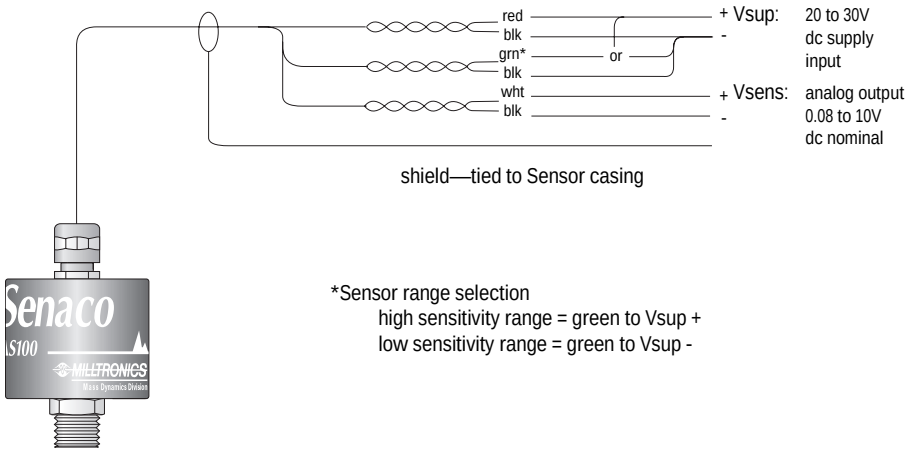
Tab acts as heat sink.

Note: If the flange temperature is 100 °C and the ambient temperature is 20 °C, the Sensor temperature at the electronics is below the maximum rating.

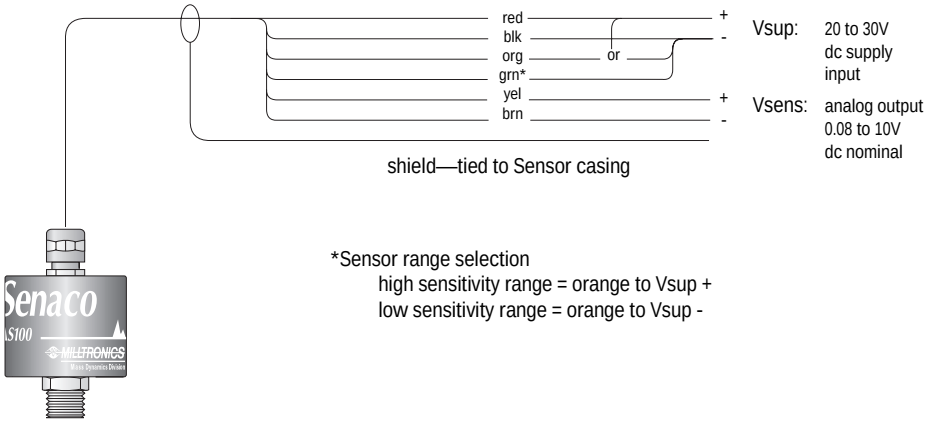
*maximum range dependent on model.

Interconnection

AS100 Standard Temperature Version (ST)



Extended Temperature Version (ET)



Notes:

- Connect shield to ground at one end only!
- If Sensor mounting is grounded, leave cable shield disconnected
- If Sensor mounting is not grounded, connect cable shield to ground

The longer the cable, the more susceptible it is to noise and earth loops. We recommended using cable with heavy gauge conductors and good RF/electrical shielding (copper braid rather than drain and foil). A proper junction box close to the sensor is an ideal location not only to extend the cable, but to also to configure the wiring for high or low sensitivity range operation.

This table provides a guideline for suitable wire gauges where distances are considerable.

Maximum distance between Sensor and supply (24V or Control Unit)

wire size			distance	
AWG	mm	mm2 *	meters	feet
24	7 x 0,20	0,22	500	1600
22	7 x 0,25	0,35	800	2600
20	10 x 0,25	0,5	1200	3900

* nominal wire size

Analog Output

The Sensor provides an analog output proportional to the level of acoustic emission activity. As the level of acoustic emission activity is a relatively good indication of process or mechanical activity, the output is suitable as an input to devices such as dataloggers chart recorders and programmable logic controllers.

The output is 0.08 to 10V (nominal), dc coupled, short circuit protected with a 60 µs time constant. The minimum load impedance is 100 KΩ. Refer to Installation on page 10 or Interconnection on page 13.

Relative Sensitivity

The sensitivity of acoustic emission is affected by temperature. In most applications this is not a concern when considering the much greater changes in signal level due to changes in flow. However, it is important to be aware of the effect.

The sensitivity of the Senaco AS100 Sensor decreases with increasing temperatures at a rate of approximately 0.5% per degree Celsius.

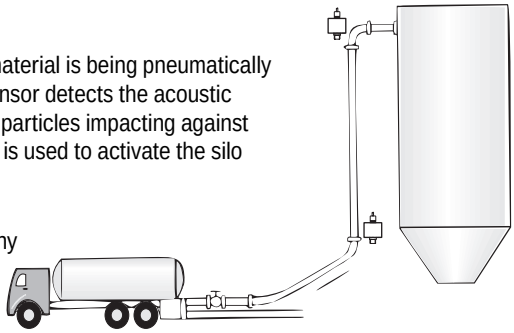
For example, if the temperature of the standard Sensor increased from 20°C to 50°C, its sensitivity would decrease by 15%. If the Sensor were to be used to monitor flow changes over such a temperature range, you should set an associated alarm setpoint at least 30% away from the normal operating level measured at 20°C.

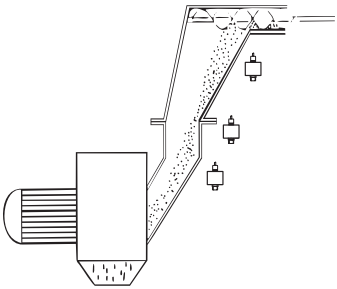
Applications

Pneumatic Conveyor

A tanker load of bulk solid material is being pneumatically conveyed into a silo. The Sensor detects the acoustic emissions generated by the particles impacting against the pipe wall and the output is used to activate the silo dust filter system.

Recommended location is any impact point along the line, such as an elbow.





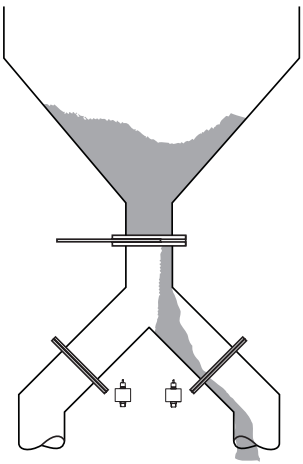
Screw Conveyor Discharge

A fibrous material is being delivered to a pelletiser by means of a screw feeder. When loss of flow is detected by the Sensor, an alarm in the control room informs the operator of a possible blockage.

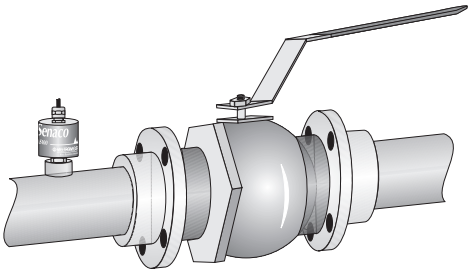
Recommended location is any point along the under side of chute, where there is friction due to the flow of material.

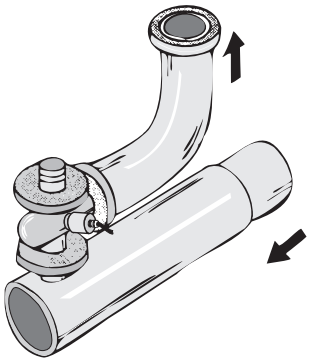
Diverter Gate

The process material is stored in a hopper and fed into the process through a diverter gate. A Sensor mounted to each leg of the diverter indicates the presence or absence of flow in the open leg. Low alarm gives early indication of problems in the diverter gate or slide gate, or of blockage or material shortage in the hopper.

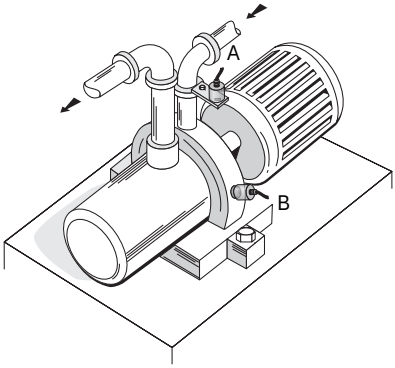


Leak Detection



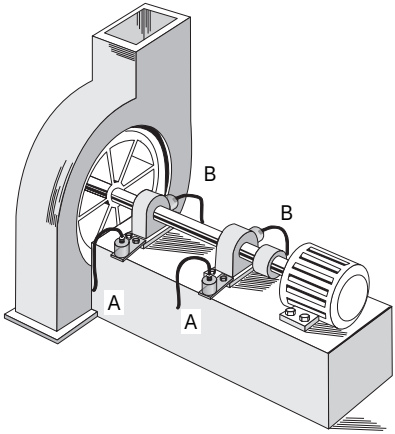


Cavitation Monitoring



Install the Senaco AS 100 Sensor in either A or B locations.

Machine Condition Monitoring



Install the Senaco AS 100 Sensor in either A or B locations.

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