

Acoustic Sensor and Controller for Bulk Solids Flow

SIEMENS

Features

- **Non-Mechanical:** Doesn't foul up or wear out
- **Noninvasive:** Doesn't break, leak, or clog
- **Simple Mounting:** Doesn't take long or require shutdown
- **Acoustic Emission Detection Technology:** Reliably detects material flow/no flow conditions
- **Two Alarm/Control Relays and 0/4-20 mA Output:** Will easily connect to your process

Reliable, Continuous Protection for Bulk Solids Flow

The SITRANS AS100 sensor prevents problems in solids flow processes caused by abnormal flow, sudden blockages, product absence, or equipment failure, such as burst filter bags. It reacts instantly to changes in flow of pellets, powders, or most bulk solids in pipes, chutes, vibratory feeders, pneumatic conveyors, and gravity flow systems.

Any sudden blockage that prevents product flow or any rupture that increases flow as product escapes from a pipe or bag is immediately detected by the AS100. This enables you to take early preventative action, avoiding expensive damage.

Early Warning of Flow Problems

The friction and impact of bulk solids flow in pipes, chutes, and conveyors all generate high frequency sound waves — noises that are often inaudible to the human ear. The SITRANS AS100 detects deviations in these sound waves caused by changes in solids flow rates and warns of impending problems.

Operation Unaffected by Plant Environment Noise

The AS100 uses unique acoustic emission technology to detect high frequency sound waves generated by equipment and materials in motion. These sound waves travel readily through solids materials, but are strongly attenuated when traveling through air. Consequently, the AS100 is immune to interference from airborne noise and low level structural vibration, providing a noninvasive method of process monitoring. Because the AS100 operates in a high frequency broadband, it is immune to competing background noise generated by machines and other processes. Audible noises and low frequency vibrations are screened out.

Simple, Low-Cost Installation

The noninvasive sensor can be installed without any shutdown of process or equipment. In minutes, the compact unit can be attached to a flat surface, pipe, flange, elbow, or joint, where acoustic emission levels are potentially highest.

The light-weight unit weighs only one pound and is easily positioned. A range of installation options are available to suit your needs. Installation can be via a clearance hole and bolt, drilling and tapping, mounting disc, or an extension tab. The unit can be screwed in, bolted in, or bonded in place. Once installed, simply connect the power supply and alarm output and set the alarm level, and the unit is fully operational.

24-Hour Protection in Tough Environments

With no moving parts and a type 304 stainless steel housing sealed against dust and moisture, the AS100 provides continuous protection around the clock and requires little or no maintenance.

Because the AS100 is mounted outside the process, it is completely noninvasive. In hazardous or hygienic food environments, this is a great advantage as there is no need for constant cleaning and concerns about product contamination are eliminated. The SITRANS AS100 is also unaffected by abrasive applications.



The standard sensor operates effectively from -4° to 176° F (-20° to 80° C), with extended temperature options offering sensing from -40° to 185° F (-40° to 85° C) or -40° to 257° F (-40° to 125° C).

Field-Proven Detection

The SITRANS AS100 monitors a wide range of granular and bulk solids materials, including:

- | | |
|--------------------------------|--------------|
| • Sugar (granulated or powder) | • Wood chips |
| • Coal (slugs to dust) | • Cement |
| • Polyethylene pellets | • Grain |
| • Cocoa beans | • Sand |
| • Fiberglass | |

Applications include:

- | | |
|------------------------------------|-----------------------------------|
| • Solids flow sensing | • Filter monitoring and switching |
| • Flow/no flow, high flow/low flow | • Burst filter bag detection |
| • Inflow blockage detection | • Route verification |
| • Cyclone blockage detection | |

Ease of Use

The AS100 system combines a highly sensitive acoustic sensor with easily set up controls. Powered by 20 or 30 VDC, the sensor provides a DC analog voltage that can be monitored by the dedicated SITRANS CU 02 control unit, or a PLC that accepts 0-10 VDC input signals.

Control Options

With a SITRANS CU 02 control unit, the system can be readily configured for setpoints indicating such conditions as high flow, low flow, or no flow, or it can be added to a control loop via a 4-20 mA output.

Two relays are fully programmable and independent of each other, and can be used to operate an alarm or switch device. The control unit can be mounted up to 1500 feet from the sensor.

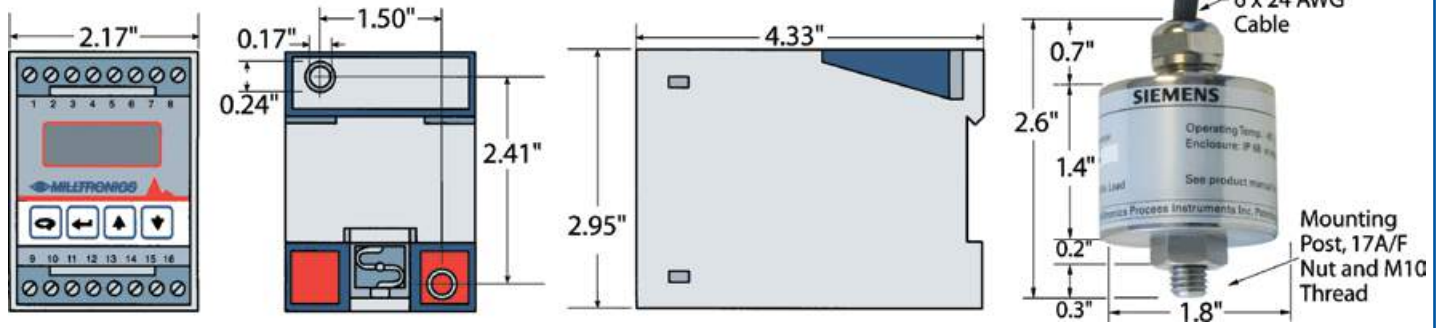
The signals are amplified and processed by the AS100 sensor to provide the levels of acoustic emission activity as a function of time.

With a CU 02 as part of the system, two relays, an LCD, and 4-20 mA outputs are provided. The sensor output can also be fed directly to a PLC accepting a 0-10 VDC signal.

The sensor can also be operated independently of the control unit by providing an external power supply.

The output is fed into a control panel, chart recorder, data logger, or programmable logic controller with a suitable input.

Dimensions



Great for plugged chute detection!
Works well in filter monitoring and
burst filter bag detection applications!

Acoustic Emission Technology: How It Works

The AS100 sensor uses acoustic emission technology, which is a completely noninvasive technique. The sensor monitors high frequency sounds or structure-borne acoustics generated by friction and impact of powders, granules, and solids in motion.

Monitoring this activity provides the basis for the sensor's exceptional troubleshooting capabilities, which are further extended by its dual range of operation.

Process and operating equipment naturally generate sounds that can span a wide range of frequencies. Low frequency sounds — whether airborne or structure borne — are often masked by irrelevant sounds from adjacent plant or machinery. This can prevent the activity of interest from being monitored. However, at the high frequencies of acoustic emission, these problems can be greatly diminished.

The AS100 is most responsive to the diffuse-field component of the acoustic emission activity: it senses the acoustic sound wave's reverberation as it propagates through the component being monitored. As a result, positioning and orientation of the sensor are not critical, as signals are readily detected at all points and orientations for a particular application. By detecting acoustic emission activity, the sensor differentiates between normal and abnormal states in a given process.

A sensitive piezo-crystal inside the AS100 sensor converts surface displacements of the structure associated with the traveling acoustic wave. It converts them into an electric signal that is amplified and processed to produce the level of acoustic emission activity as a process of time.

Looking for an acoustic system to measure noise in oscillating displacement pumps, conveyors, or channels?

Siemens SITRANS DA400 detects high-frequency acoustic oscillations created by friction and impact of mechanical parts or bulk solids in pipes, raceways, channels, chutes, conveyors.

Call for price and availability.



Specifications

Sensor

Power: 20 to 30 VDC, 18 mA typical

Relative Sensitivity: 0.5%/°C average, over the operating range

Output: Analog, 0.08 to 10 VDC nominal, 100 KΩ min. load impedance

Cable: *Standard:* 13'; PVC jacket, 3 twisted pairs, 24 AWG, shielded; *Extended:* 13'; thermoplastic elastomer jacket, 6 conductor, 24 AWG, shielded

Housing: 304 stainless steel; **Ingress Protection:** IP68 (waterproof)

Control Unit

Power: 100, 115, 200, 230 VAC ±15% 50/60 Hz (factory set); **Excitation:** 26 VDC nominal, 70 mA max; **Consumption:** 10 VA max

Analog Input: 0-10 VDC, from sensor

Analog Output: 4-20 mA, isolated output, 750Ω max; **Switched:** Two Form C relays, latching or nonlatching 5 Amp at 250 VAC non-inductive

Alarm and Startup Delay: Adjustable from 0 to 999 seconds

Operating Temperature: -4° to 122° F ambient

Housing: Polycarbonate; **Ingress Protection:** IP20

Wall Mount Display: LCD, 3 digits plus symbols

Ordering Instructions

Pick one control unit, and then select your sensor configuration by choosing one option from each table section below. A complete catalog number looks like this: 7MH7562-2AA and 7MH7560 - _____

Model Selection Guide

Description		Catalog Number	Price
SITRANS CU-02 Control Unit, 115 V Power		7MH7562-2AA	\$567.00
SITRANS CU-02 Control Unit, 230 V Power		7MH7562-4AA	567.00
SITRANS AS100 Acoustic Sensor		7MH7560-	862.97
Sensor	Standard (-4° to 176° F) (Note 1)	1A _ _ _ -	0.00
	Extended (-40° to 257° F) (Note 2)	3A _ _ _ -	269.28
	Extended (-22° to 248° F) (Note 3)	4A _ _ _ -	269.28
Mounting	None	_ _ A0 _ -	0.00
	Mounting Disk	_ _ B0 _ -	70.38
	Extension Mounting Tab	_ _ C0 _ -	70.38
Approvals	CE	_ _ _ _ 1	0.00
	CE, FM/CSA Class II, Div 1, Grps E-G	_ _ _ _ 3	140.76
	CE, CSA Class II, Div 1, Grps E-G	_ _ _ _ 4	140.76
Accessories	Mounting Tab	7MH7723-1AA	77.38
	Mounting Disk	7MH7723-1AB	77.38
	1/2" NPT Adapter Kit (Sensor 1)	7MH7723-1BW	202.46
	1/2" NPT Adapter Kit (Sensor 3)	7MH7723-1BX	202.46
	AS100 English Manual	A5E31952194	13.78
	CU-02 English Manual	7ML1998-5DN01	13.78

Note 1: Not available with FM approval (Approval 3)

Note 2: Available only with CE approval (Approval 1)

Note 3: Available only with CE/CSA approval (Approval 4)