



Gladiator Acoustic Switch Series

Description

The Acoustic Switch is designed for continuous operation in dusty, wet environments where other technologies fail.

The Gladiator Acoustic Switch uses Acoustic Wave technology in a Sender / Receiver format, for blocked chute detection and anti collision of heavy machinery.

Points of Difference

HAWK's Acoustic Wave Transducers - Self Cleaning

The Acoustic Switch is a low frequency (20 kHz or 15 kHz) acoustic device with a "self cleaning" capability. They are not affected by the dielectric characteristics in the environment that they work in. These were developed to operate in chutes with coal lump or fines passing through or around the measuring beam.

The 15 kHz Titanium diaphragms of the transducers provide excellent wear rate characteristics. Each pulse (4 per second) of each transducer creates a pressure wave effect that provides ultrasonic cleaning. Water sprays directly onto the transducers diaphragms have no effect on receiving or transmitting pulses.

Why Use Acoustic Wave?

Advantages

- Acoustic Switch can be mounted low in the lump and fines chute, to detect blocked chutes early, saving on lost downtime. The low frequency transmitter can operate in windy conditions. It is:
 - Immune to dust, particles in suspension, fog, rain or repose angle changes on the stockpile
 - Self-cleaning and ensures that the face of the units always remains clean.

Principle of Operation

The Gladiator Amplifier powers two Acoustic Wave Transducers which use special HAWK developed software where both units pulse and receive each others Acoustic echoes.

When the path between the Transducers is blocked, the unit immediately detects the absence change of the return signal and triggers a relay for indication or control purposes. The Transducers work together and independently to detect pulse interference giving twice the application security.

HAWK's Acoustic Wave Transducers are self cleaning. The power of each pulse (pressure wave) blows water, moisture and build-up off the face of the diaphragm.

Primary Areas of Application

- Brewing
- Cement
- Chemical
- Fertilizer
- Food & Beverage
- Glass
- Mining & Metals
- Packaging
- Paper
- Pharmaceutical
- Plastics
- Refining
- Sugar
- Water & Wastewater
- Sewage Sludge
- Power Generation (Coal Fired).

Acoustic Cleaning





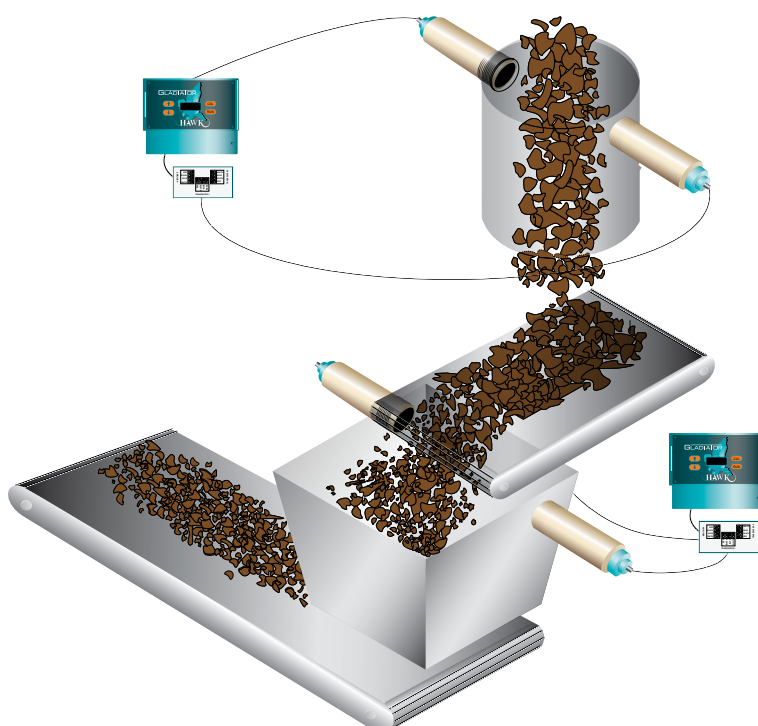
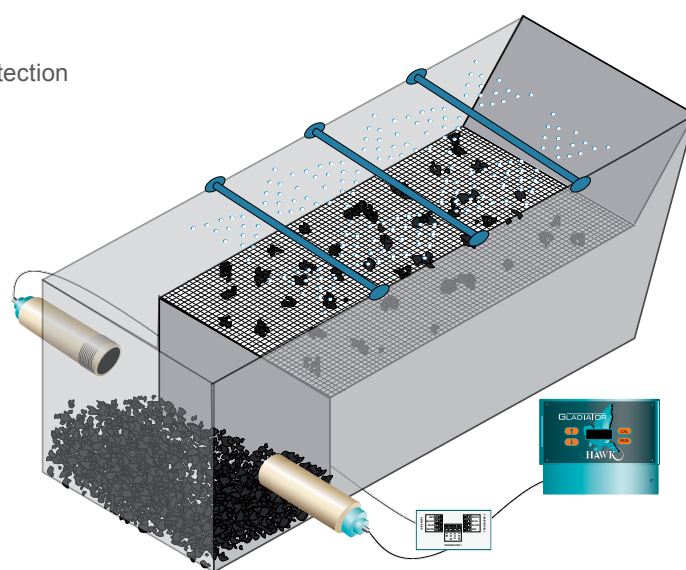
Typical Applications



Process Protection - Blocked Chute

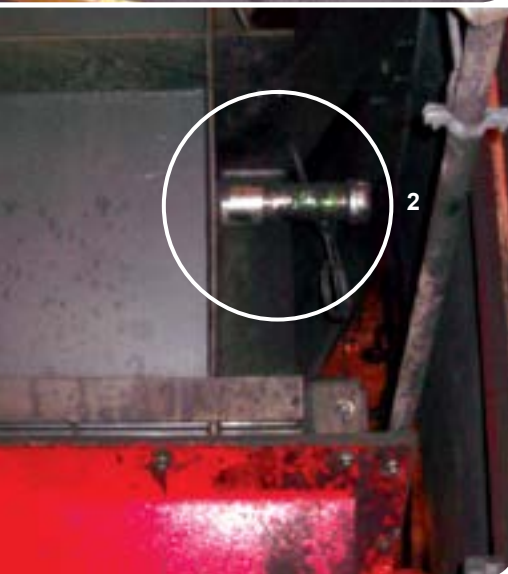
Bulk Solids

- Material flow blockage detection
- Designed for wet and dusty environments
- Self cleaning Transducers dislodge and prevent build up
- Heavy duty Titanium version for product impact resistance
- Apron Feeder Protection
- Reclaim conveyor blockages
- Blocked Chute
- Jam protection
- Slurry
- Sludge product





Application Reference - Gladiator Acoustic Switch



Reliable “Self Cleaning” Acoustic Level Transmitters and Acoustic Low Level Switches for train unload station at coal export terminals.

Application Problem

1. To measure the coal in the dump station hoppers, as the rail wagon unloads, providing a stable and reliable output signal under all environmental conditions, with no cleaning requirement.
2. To provide a backup non-intrusive, low level switch in the train dump station to protect the apron feeders.

Solution

1. HAWK has provided many Acoustic Level Transmitters, for applications to control automatically, train unload stations. Low frequency Sultan Transducers are used to monitor wet coal, dry coal, dust, noise, fast filling etc. Under all environmental conditions, the 10 kHz transducer selected has a maximum range of greater than 50m (165ft) and will adequately cover all changes in the bin automatically. The level measurement will remain stable during overfill conditions. The output will remain high until the level returns to the normal range. Because the power pulse of the 10 kHz is high, it is self cleaning. The focalizer cone is made from flexible polyurethane and is designed for this service.
2. HAWK also provided self cleaning Acoustic Switches for low level protection to the apron feeders. Acoustic technology is not affected by the wet environment. Transducer diaphragms are made from titanium which is an excellent wear plate material.
3. The Acoustic Continuous Level Transmitters are available with D.I.P or intrinsic safety for applications that require explosion hazardous area certification.

Ordering Information

Part number for continuous level:

1 x AWR234SUXXXX
Remote Sultan Transmitter
1 x AWRT10S4XXXC15XX
Remote 10 kHz Transducer
1 x C10-10-8
Rubber / Polyurethane Cone
1 x FA10A-4
Flange 10-00" ANSI

Part number for low and high level detection:

1 x GSASUS
Gladiator Remote Amplifier
2 x AWRT15Y4XXXC15XAS
15 kHz Titanium face, 15M cable
1 x AWRT-JB-06
Junction Box
2 x FA4A-4
4" ANSI Flange



Application Reference - Gladiator Acoustic Switch



Fines buildup
behind the
impact door

Reliable “self-cleaning” Acoustic Level Blocked Chute Switches, for lump and fines conveyor transfer chutes.

Application Problem

Two approaches were used for Blocked Chute detection in his conveyor transfer chute. The first technology was the hinged impact door, that would open when a blocked chute condition developed in the chute and a proximity sensor would indicate that the door had moved. The problem was that buildup of fines material behind the door, sometimes prevented the door from operating if the operator, didn't hose down the chute on a constant basis. The other problem with the impact door, was that after each blocked chute condition, when the door opened, an operator, would need to clear the door jam, and reset the switch.

The second technology used, was a tilt switch, higher up in the chute. It provided additional protection, when bridging of wet ore prevented flow through the chute. Bridging generally occurs with wet or damp ore. Over time, the tilt switch suffered buildup issues which prevented it from detecting a blocked chute condition. Operators needed to hose down the tilt switch on a constant basis.

The cost for mines and port facilities was to measure downtime of production in \$100,000's, then a relook at the technology that has been used, is justified.

Solution

For both applications the self-cleaning Acoustic Switch was used. It cleans by way of the low frequency pressure wave that is produced with each pulse of the transducers. The Acoustic technology can tolerate both wet and dry ore as they are not reliant on a dielectric constant in the ore to produce a switch point. The transducer diaphragms are made from Titanium and therefore are a wear plate in their own right. The Acoustic Switch system is a fully failsafe switch that can also provide additional pre-maintenance warning on critical chute applications.

The Acoustic Switch system compared with the tilt switch provided more advantages as it can tolerate ore flowing through the measuring beam, allowing for the Acoustic Switch to be mounted lower in the chute, providing a faster blocked chute detection. This reduced the downtime problem of digging out the chute when the tilt switch did operate.

Ordering Information

Each system comprises:	1 x AWRT-JB-06
1 x GSASUS	Junction Box
Gladiator Remote Amplifier	2 x FA4A-4
2 x AWRT15Y4XXXC15XAS	4" ANSI Flange
15 kHz Titanium face, 15M cable	