

Rock/Aggregate/Mining Applications

- Conveyor Slow-Down Detection
- Belt Misalignment
- Tilt Switch
- Crushing/Size Reduction –Vibration Monitoring



Quarries and mines present extremely harsh environments where machinery needs to be proactively monitored for efficient operation and the safety of plant personnel. Electro-Sensors has a range of shaft speed switches and sensors, along with vibration, temperature and level monitors all designed to operate in extreme conditions. Shaft speed switches provide protection for conveyors, preventing damage and product waste from overloads, worn parts or machinery breakdowns. Vibration monitors protect the operational integrity of crushers and hammermills. Level monitors provide valuable feedback to machinery operators, and temperature sensors guard against conveyor belt misalignment or machinery overheating. Electro-Sensors manufactures a wide range of industrial-duty products to protect your operations and operators.

Shaft Speed Monitoring – Overland Conveyor System



Overland Conveyor System

ESI Product: M100 Shaft Speed Switch with 255 Pulser Disc

Application: Monitor tail pulley for slowdown due to belt slippage or breakage.

Why: Unwanted slowdown or stoppage of a conveyor can result in costly and even dangerous conditions. Product waste, machine damage, process downtime, and unsafe working conditions can all be attributed to conveyor failure. Bulk raw materials such as grain or rocks may be damp or wet – adding significant weight to the conveyor belt and leading to belt slippage or slowdown. Conveyor belts can break due to overload, wear and tear, or motor burnout. Shaft speed switches detect these conditions and alert the operator *before* a crisis becomes a catastrophe.

How it works: The M100 shaft speed switch monitors the rotation of the non-driven tail pulley, receiving a digital pulse train from the 255 magnetic pulser disc. The M100 decodes this frequency signal to determine shaft speed and then compares this to the pre-adjusted set point. In the event of a fault condition such as belt slippage or product overload, the relay, pre-calibrated by the operator and usually set at about 90% of operating speed (RPM) can be used to provide an alarm or equipment shutdown, assuring machine protection and process integrity.

Benefits:

- Economical 2 Piece System
- Rugged and Field-Tested
- UL & CE listed
- Simple to Install and Calibrate
- Suitable for Hazardous Locations
- Proactive Machinery Protection



M100 with 255 Pulser Disc



Monitoring the Tail Pulley on a Conveyor

Belt Misalignment – Conveyor Belt Monitoring



Typical Overland Conveyor Setup in a Rock Quarry

ESI Product: BA100 Series Conveyor Belt Alignment Switches.

Application: To monitor belt tracking and sense when the belt wanders out of alignment due to wear or overloading.

How it works: The BA100 is mounted on the frame of the conveyor and adjusted so the roller arm is the correct distance and angle from the outside edge of the belt. When the belt wanders out of alignment it makes contact with the roller actuator arm, causing the belt alignment switch to send an alarm or conveyor shutdown signal. Typically four belt alignment switches are recommended per conveyor. Two units mounted across from each other at the head pulley and two more units mounted across from each other at the tail pulley. For long curved conveyor belt runs, it's recommended to install one additional alignment switch at the outside of the curve in the middle of the run.

Typical power plant application:

A series of belt alignment switches would typically be installed along an overland conveyor system to prevent the possibility of machine damage, product waste and downtime should a fault condition occur.

Benefits:

- Early level warning - less product waste
- Rugged probe construction
- Accurate monitoring system
- Prevent damage, waste, and downtime



BA100 Belt Alignment Switch Unit



Typical Belt Alignment Switch Installation

Level Sensing – Tilt Switch



MTS-20 Tilt Switch Probes

ESI Product: MTS-Series Tilt Switch Probes & SCU-200 Control Unit.

Application: To sense the presence/absence of bulk materials such as rocks or aggregate and provide an early warning of high or low level condition.

How it works: The probe is mounted to hang vertically and has closed contacts at this point. When the probe tilts to an angle of 15° the contacts open providing an output or indication of fault condition.

Typical power plant applications:

High-Level Boom Control - The boom conveyor deposits quarried rock in large storage piles. When the pile reaches the height of the boom a level monitor just below the boom indicates that the high point has been reached and the boom is moved to start a new pile allowing the operator to maximize stockpiling space in the quarry.

High-Level Alarms for Silos, Bunkers and Surge Bins - Level monitors used for high-level indication have two purposes; to provide an alarm indicating when a silo or bin is full and to prevent overfilling, which can result in material and time wasted. Often two switches are used: one to indicate a high-level condition and a second to serve as an overfilling alert.

Benefits:

- Early level warning - less product waste
- Rugged probe construction
- Accurate level monitoring
- Prevent spills & leaks at conveyor transfers



MTS Tilt Switch Control Unit and Probe

ESI Product: VS-Series Vibration Monitors**Application: Monitor for excess vibration due to wear and tear**

Why: The abrasive action of the hammers and the type of material being reduced can wear the hammers or crushers out unevenly, causing imbalance and excessive vibration which, if left unchecked can lead to catastrophic damage to machinery, product waste, and dangerous operating conditions. Mounting a vibration monitor on the external enclosure of a hammermill or crusher provides a means of quickly identifying a fault condition, and enabling immediate shut down minimizing machinery damage and product waste.



How it works: The VS-1 mounts directly to the hammermill or crusher and has an adjustable relay output that can be wired to an alarm or motor shutdown circuit. The VS1 has 3 LEDs on the front cover for at-a-glance visual indication of the circuit condition and easy visual machine status inspection. Calibration is quick and easy minimizing costly machine downtime. The VS-1 is a self-contained vibration monitoring system and can be installed without any additional brackets or mounting equipment. It has an input voltage of 24vdc with the option of a 115vac power supply to cover most applications.

Benefits

- Economical self-contained unit
- Rugged and compact vibration monitor
- Installs on a wide range of machinery
- Alarm delay avoids false trips on startup and normal operation
- Simple installation and calibration avoids costly downtime



VS1 Vibration Monitor

