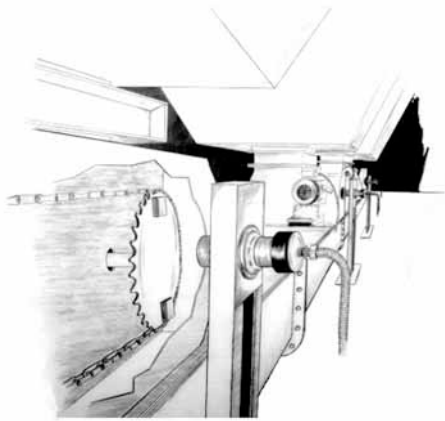


Overview

Process protection devices act as early warning systems to avoid costly process interruptions and breakdowns of equipment. Non-contacting motion sensors detect changes in motion and speed of conveying, reciprocating and rotating machinery.

Non-invasive acoustic sensors detect inaudible, high frequency acoustic emissions generated by friction and impact, caused by materials in motion. They can detect conditions of flow/no flow or high/low flow, to warn of blockages, product absence or equipment failure. They are located outside of the process, accurately detecting conditions without wear on the sensor.

Motion sensors can warn in case of equipment malfunction and shut down machinery in case of a slowdown or failure. They are rugged and perform even in harsh industrial conditions. All of the MFA 4p motion sensing probes as well as the Millpulse 600 can be mounted up to 100 mm (4") from the ferrous target, reducing the chance of damage to the probe and the equipment. The probes are not affected by moisture or dust build-up.



Motion sensing on drive shaft of rotary feeder

Mode of operation

Acoustic Sensing

Acoustic sensors monitor high frequency emissions generated by friction and the impact of flowing material or mechanical parts. The sensors can also sense the turbulence of gases or liquids leaking through valves and flanges. When matter vibrates between 0 Hz and 200 kHz, it creates acoustic energy. Sound energy between 20 Hz and 20 kHz can be detected by humans. Acoustic sensors detect high-frequency acoustic energy between 75 kHz and 175 kHz. Acoustic energy travels quickly through dense materials (metal) and poorly through less dense materials (air). Because the acoustic sensors are mounted directly to the external wall of the chute work, other plant noises are well below 75 kHz and effectively ignored by the sensors.

The acoustic sensors contain a specialized piezocrystal and filter circuit that responds effectively to the high-frequency band between 75 kHz and 175 kHz. As the crystal is excited by the acoustic energy, it produces a continuous electrical signal in direct proportion to the level of acoustic energy received. The SI-TRANS AS100 sensor output of 0 to 10 V DC can be applied to a PLC or to an optional control unit for a programmable alarm relay or 4 to 20 mA signal output.

Motion sensing

Siemens Milltronics probes work on the principle of Faraday's Laws of Electromagnetic Induction. When a ferromagnetic object enters the probe's permanent magnetic field, it distorts the flux, causing its coil windings to generate a voltage. This voltage is proportional to the strength of the magnet and the number of wire turns in the coil (constant in the probes) and the speed at which the ferrous target passes through the flux. The generated voltage is also inversely proportional to the square of the distance between the target and the probe.

The robust motion sensors provide the contacts to shut down machinery whenever under-speed, over-speed or plant equipment failure occurs. On belt, drag and screw conveyors, or on bucket elevators, fans and pumps, the speed alarm option can warn instantly of equipment malfunction. Some probes may be linked to a programmable logic controller to monitor equipment.

Process protection

Acoustic and Motion Sensing

Technical specifications

Process Protection Selection Guide

Criteria	SITRANS DA400	SITRANS AS100	Milltronics MFA 4p	Milltronics Millpulse 600	Milltronics ZSS
Typical industries	Mining, water/wastewater, chemicals/petrochemicals and oil & gas industry	Aggregates, grain, cement, food processing, power generation, steel processing	Aggregates, cement, mining, wastewater, grain	Aggregates, cement, mining	Aggregates, cement, mining
Typical Applications	Oscillating displacement pumps such as diaphragm piston pumps, piston pumps and hose-type diaphragm piston pumps. Monitoring of flowing materials in pipes, conveyors or channels.	Pipes, pneumatic conveyors, aerated gravity flow systems, burst filter bag detection	Tail pulleys, driven pulleys, motor shaft sensing, screw conveyor flights, bucket elevators	Tail pulleys, driven pulleys, motor shaft sensing, screw conveyor flights, bucket elevators	Tail pulleys, driven pulleys, motor shaft sensing, screw conveyor flights, bucket elevators
Operation	Acoustic detection of cavitation, optionally acoustic detection of impact noises of high frequency	Acoustic sensing	Motion sensing	Motion sensing	Motion sensing
Enclosure	Electronics housing, Makrolon IP65, sensor, stainless steel material number W.-Nr. 1.4571 (316Ti SST)	Compact 304 or 303 stainless steel, IP68	Type 4X/NEMA 4X/IP65 polycarbonate	Type 4X/NEMA 4X/IP67 aluminum	Type 4X/NEMA 4X/IP67 aluminum
Sensor mounting	Screw to outside of pump housing. For material flow monitoring on the outside of pipes, channels, chutes or raceways	Sensor non-invasive: glue or weld-on disc, bolt or weld-on tab, drill and tap	Non-contacting probes secured with supplied flange	Non-contacting, secured with supplied flange	Non-contacting, secured with supplied flange
Operating temperature	Electronics -20 °C to +60 °C (-4 °F to +140 °F) Sensor -20 °C to +110 °C (-4 °F to +230 °F)	-20 to +80 °C (-4 to +176 °F) ¹⁾	-20 to +50 °C (-4 to +122 °F) ²⁾	-40 to +60 °C (-40 to +140 °F)	-40 to +60 °C (-40 to +140 °F)
Power requirements	19 V to 36 V DC, < 100 mA	20 to 30 V DC, 18 mA	100/115/200/230 V AC ± 10 % 50/60Hz, 15 VA	Switch 18 to 48 V AC/DC or 60 to 135 V AC/DC	115 or 230 V AC ± 10 % 50/60 Hz, 7 VA
Approvals	CE, PROFIBUS DP and PROFIBUS PA conform, Ex protection to ATEX 1G or 1D	CE, CSA/FM Class II, Div. 1, Group E, F, G optional, ATEX II 3D optional	CSA _{US/C} , CE	CSA _{US/C} , CE	CSA _{US/C} , CE

¹⁾ Extended temperature model -40 to +125 °C (-40 to +257 °F) available (CE version)

²⁾ Probes available for -40 to +260 °C (-40 to +500 °F)