Soaring Towards Excellence in Level Measurement

Mining I Water I Wastewater I Chemical I Oil & Gas I Plastic I Power >

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HAWK's Vision & Mission Statement

Vision

Above & Beyond:
Every action soars towards excellence in process technology solutions

Mission

A high performance team, working together,
to provide high quality service and products, every time

HAWK, Since 1988

Hawk Measurement Systems Pty Ltd (HAWK) was established in 1988. It's founding members saw the universal requirement of various industries requiring improved process control and efficiency in their operations.

One product, the "Rangemaster", soon became an entire product range, all designed and manufactured to provide level measurement in even the most difficult applications. HAWK Product's can proudly claim to work across a range of level measurement applications which have historically been impossible.

To complement our product range, HAWK's aim is to provide comprehensive expertise in level measurement applications. From initial consultancy, to after-sales support, our staff are trained and motivated to ensure we provide solutions, not only a product.

HAWK's on-ongoing commitment is to have the highest possible standards in manufacturing and quality control. HAWK's production procedures are continually evolved to ensure the best quality with the shortest possible delivery time.

HAWK has received numerous official awards for innovative and breakthrough technology, and also for manufacturing & exporting excellence.

Today, HAWK is recognised as a world leader in level measurement technology. Our distribution network includes branches in the USA and China, multiple domestic Australian offices, and an extended Global Distribution network.

For any level measurement applications, from the simplest, to what others deem impossible, please contact your local HAWK Office or distributor. We can help.

Application Solutions

HAWK products are inherently designed to solve application issues, and we adapt the technology to suit the environmental requirements.

Acoustic Wave

In general, ultrasonic technology has difficulties detecting signal in dusty and agitated environments. Acoustic Wave products were created specifically for these issues. They use higher power and lower frequency than ultrasonic devices. This allows the pulse to travel with minimal signal losses. Echoes are detected where previously impossible. Stand next to an Acoustic Wave product, and you will easily hear the difference in the applications power of the pulse. A technology with no direct comparison.

Self Cleaning

Many applications have issues with material buildup on the face of their level control instrumentation. This results in costly and time consuming maintenance, or expensive and difficult cleaning systems involving water jets and compressed air. Acoustic Wave products use the power of their pulse to continually clean the transducer face, eliminating this requirement.

Advanced Microwave Transmission

HAWK Microwave technology uses high power and low frequency to achieve superior performance over distances of up to 200 meters in more difficult conditions. It is non contact, and can be installed outside of hazardous environments.

Sonar - Accurate Interface & Bed Level

HAWK's revolutionary Sonar system provides accurate and continuous measurement of interface and bed level in thickeners, resulting in optimized operation of underflow densities, reduction of chemical use and improved efficiencies of settling rates.

Guided Wave Radar

HAWK's guided wave radar system has high sensitivity to ensure it is capable of detecting level in a large range of applications.

Switches

HAWK has a complete range of high quality detection switches to suit a range of applications and industries. This includes vibration fork, admittance and conductivity detection principles.

We Can Help

HAWK understands the difficulties customers face when seeking accurate level measurement. Every application is different, involving a multitude of environmental factors. This is where HAWK excels. Our aim is to ensure that customers feel comfortable with our technology, and are provided with long term and reliable solutions. We believe that a combination of application and product expertise, as well as forward thinking and proactive support policies are the foundation of successful customer-supplier relationships.

Progressive Technical Support

HAWK believes that the future of the Level Measurement Industry revolves around the quality of pre and post sales-support. Our aim is for all sales & support staff to be product experts, and more importantly application experts making our customers applications as efficient and consistent as possible.

Remote Innovation

HAWK understands the need for immediate technical assistance.

The HawkLink 3G communication device allows any computer with internet access and our free GosHawk diagnostic & calibration software; to dial in; calibrate, test, and check the performance of HAWK products. This innovative system allows our Global Support Team to assist with commissioning and after sales service of HAWK equipment worldwide. Measurement problems are addressed as they happen; not days or weeks later.

Knowledge Sharing

HAWK believes that knowledge sharing is key to creating long term relationships.

Empowering our customers and our worldwide distribution network, whilst being available at all times to lend a helping hand, is the perfect recipe for long term solutions and relationships.

HAWK openly extends an invitation to share our 25 years of level measurement experience, and ensure that your day to day processes are efficient, understood, and always working.

Product Overview

Continuous Level Transmitters

Sultan Acoustic Wave Series

The Sultan is a non intrusive Acoustic Wave transmitter with flexibility used for level measuring liquids, slurries and solids.

The transmission of Acoustic Waves ensures minimal losses through the environment where the sensor is located. Remote, Integral & SMART units are available. The Sultan can operate as a 2, 3 or 4 wire system.

Continuous Level Transmitters

MiniWave Ultrasonic Level Series

MiniWave is a compact, loop-powered ultrasonic level transmitter for continuous measurement of liquids.

Easy and flexible mounting combined with high chemical compatibility and 12 metres (40ft) measuring range makes the MiniWave suitable in multiple applications in all industries.

Continuous Level Transmitters

Centurion Guided Radar

The HAWK range of Guided Radar products are ideal for the measurement of liquids, sludge, powders and granules to a range of 18.5m for level. This technology is not affected by pressure, temperature, viscosity, vacuum, foam, dust, changes in dielectric constant or coating of the probe.

The precise and continuous level measurement technology of the HAWK Centurion Guided Radar (CGR) is spot-on for a variety of applications such as Chemicals, Petrochemicals, Cement Powders, Grain Industry, Paper & Pulp and Oil & Gas.

Blocked Chute Protection Switches

Gladiator Acoustic Switch Series

The Gladiator Acoustic Switch uses Acoustic Wave technology in a Sender / Receiver form for blocked chute detection, heavy machinery detection, and as a point level switch in difficult conditions.

Acoustic Wave Technology provides the added self-cleaning feature required for applications where material has the potential to coat / stick to side walls or sensor transducers.

Product Overview

Blocked Chute Protection Switches

Circular Polarization & Dynamic Gain Control

Gladiator
Gen 3 Microwave Switch Series

The Gladiator Gen 3 Microwave provides point level detection of most solid materials.

It can be used in any application where microwave energy is absorbed by the material being monitored, and replaces traditional contact switching devices.

Blocked Chute Protection Switches

Circular Polarization & Dynamic Gain Control

G1 Microwave Switch Series

The G1 Microwave Switch can be used for blockage detection, barrier detection, machine detection, collision detection for protection, point level measurement, and detection of objects or material between two points.

A high power circular polarized Microwave pulse is emitted from the Sending unit to the Receiving unit in a transmission chain of approximately 100 pulses per second.

Sonar Bed Level System

Mining / Heavy Industry

ORCA Sonar System

The ORCA Sonar will measure up to two density interfaces simultaneously. Typically these are bed level / RAS blanket and floc / fluff layer. The sonar produces a high power concentrated beam, and provides critical plant control to optimize performance.

Sonar Bed Level System

Water / Wastewater Industry

Sultan Sonar System

The Sultan Sonar uses a low frequency sonar to measure and control Waste Water Clarifiers and Thickeners. The system is easy to use and the innovative design provides critical plant control to optimize performance.

Point Level Switches

Gladiator Pump Protection Switch

The Gladiator Pump Protection switch can be used in applications where pipe or wall mounting with minimal protrusion is required.

It can also be used to detect the presence of liquids to ensure the pump does not run dry.

Point Level Switches

Gladiator
Admittance Smart Switch Series

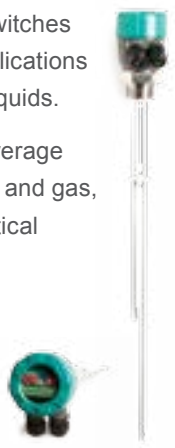
The Gladiator Admittance switch is an all-round point level switch for detecting the level of liquid, slurry or powder. The unit measures the capacitance or “admittance” between the probe and the wall of the container. It operates in tough industrial environments and has high immunity to product build-up.

Point Level Switches

Gladiator
Conductivity Smart Switch Series

Gladiator Conductivity switches are suitable for most applications that involve conductive liquids.

It is used in food and beverage processing, chemical, oil and gas, paint, paper, pharmaceutical and water / wastewater treatment plants.



Product Overview

Point Level Switches

Gladiator
Vibration Smart Switch Series

Gladiator Vibration switches are used for a wide range of liquids and solids.

This versatile switch is suitable for many applications requiring level detection, including pump control, high or low-level alarms, for presence / absence of materials.

Point Level Switches

RS4000 Rotation Switch Series

A Rotating Switch vane is driven by a slow speed synchronous geared motor.

For safe and multi-purpose level monitoring in all types of containers and silos. It can be used with all bulk materials and powders as a simple point switch.

Machinery Anti Collision Systems

Sultan
CraneMaster Anti-Collision Systems

The Sultan CraneMaster Anti-Collision system offers major benefits when control and position functions are required for large moving machinery.

Non Contact Flow Measurement

Sultan
Flow Measurement System

The Sultan Flow Measurement System is capable of monitoring liquid flow under the most difficult conditions.

It suits a broad range of flumes, weirs and flow control structures using application pre-sets or a 32 point custom measurement table.

Machinery Positioning Systems

Sultan
Machinery Positioning System

The Sultan Machinery Positioning System is a non contact, two piece Master and Slave distancing transmitter for ranges up to 195 metres.

Communication

HawkLink
Advanced Remote Communication

HAWK offers a wide range of communication possibilities: GosHawk, DeviceNet, HART, Modbus, Profibus DP, Foundation Fieldbus and Profibus PA. Remote technical support and complete commissioning of equipment in applications via a 3G module, allows monitoring and adjustments of settings no matter what corner of the world.

Sultan Acoustic Wave Series

Description

The Sultan is a non intrusive Acoustic Wave transmitter with flexibility used for level measuring liquids, slurries and solids.

The transmission method of Acoustic Waves ensures minimal losses through the environment where the sensor is located. Remote, Integral & SMART units are available. The SULTAN can operate as a 2, 3 or 4 wire system.

Points of Difference

HAWK's Acoustic Wave Transducers - Self Cleaning

The Sultan Acoustic Wave is a low frequency acoustic device with a "self cleaning" capability.

The self cleaning pressure wave, produced with each pulse of the transducer, removes water and dust fines from the face of the diaphragm of the transducer.

They are not affected by the dielectric characteristics in the environment that they work in.

Why Use Acoustic Wave?

Advantages

- The low frequency transmitter can operate in harsh 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
  - Can use Flexible Polyurethane cones that are immune to rock impacts etc.

Principle of Operation

The SULTAN 234 emits a high powered Acoustic Wave transmit pulse which is reflected from the surface of the material being measured. The reflected signal is processed using specially developed software to enhance the correct signal and reject false or spurious echoes.

The transmission of high powered Acoustic Waves ensures minimal losses through the environment where the sensor is located. Due to the high powered emitted pulse, any losses have far less effect than would be experienced by traditional ultrasonic devices. More energy is transmitted hence more energy is returned. Advanced receiver circuitry is designed to identify and monitor low level return signals even when noise levels are high. The measured signal is temperature compensated to provide high accuracy.

Primary Areas of Application

- Dirty dusty and build up prone applications
- Self Cleaning sensor face requires no maintenance.

Water / Wastewater:

River Level, Wet Wells, Inlet Screens, Tanks, Sumps, Pump Stations, Water Towers, Dams, Basin Levels, Chemical Storage.

Mining:

Crushers, Surge Bins, Ore Passes, Conveyor Profiles, Blocked Chutes, Stockpiles, Stackers, Reclaimers, Storage Silos, etc.

Power Stations:

Boiler Bunkers, Raw Coal Bunkers, Ash Pits, Fly Ash Silos, etc.

Others Industries:

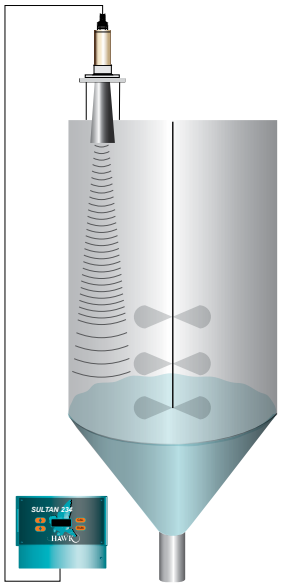
Food, Cement, Plastics, Grain, Chemicals, Paper, Irrigation, Quarries.

Features

- Non contact measurement
- High Power even with two wire loop supply
- Low cost per point
- Wide range of communications: DeviceNet, GosHawk, HART, Modbus, Profibus DP, Foundation Fieldbus & Profibus PA
- Pump Control x5 pumps
- Auto compensation for dust, steam and losses
- Protection class IP67, NEMA 4x (IP68 Transducer)
- Programmable fail safe mode
- 3G remote setup options / configuration
- Differential and average level control (2 transducers).

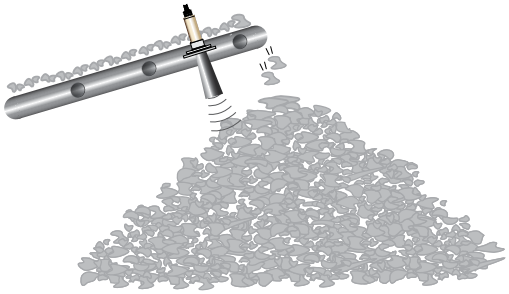
Typical Applications

Conical Shape Vessels



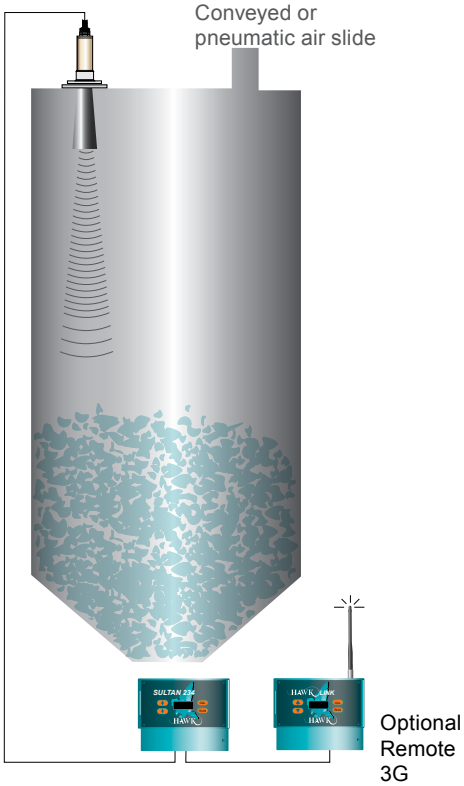
Horizontal Cylindrical / Tanks

Stockpiles, Stackers, Reclaimers



Solids Vessels

High / Low / Continuous level
(Granular / Powder)

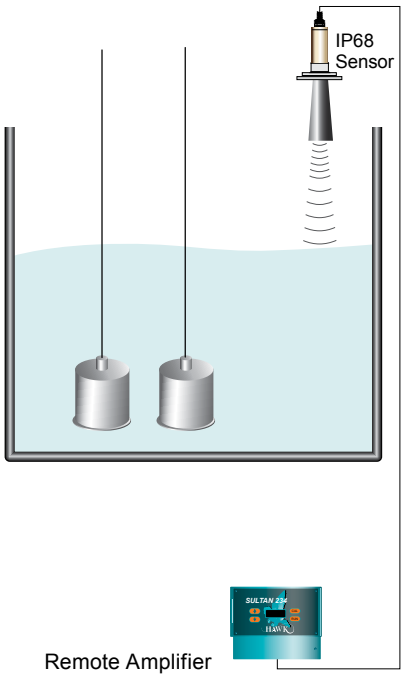


Storage Tanks

High / Low / Continuous level
(Liquid / Chemical)

Sewage Wet Well

High / Low / Continuous level and central of up to 5 Pumps



Application Reference - Sultan Acoustic Wave

Self-Cleaning Acoustic Level Monitoring for Iron Ore Truck Dump With Water Sprays.

Application Problem

The client at a large Iron Ore export mine, had problems with radar level transmitters that were being used to monitor level in the truck dump, for controlling the apron feeder and providing a signal to the truck drivers as to when to dump. These Radar Transmitters were being affected by the wet conditions, as well as the iron ore fines buildup over the transmitters. The environmental conditions caused intermittent faults to occur with high downtime costs.

Radar technology is affected by high dielectric buildup (wet iron ore) and therefore was not the correct choice of technology for the application.

Solution

We installed a low frequency Acoustic transmitter as replacement technology. Acoustic technology is not affected by the wet environment, and the self-cleaning pressure wave produced with each pulse of the transducer removed water and fines from the face of the transducer.

With Acoustic transducers, it is important to size the transducer frequency according to the environment that the instrument must work in, rather than the actual range of the application. The 10 kHz transducer has a practical operating range of over 50m (165ft) measuring solids, but the operating range of the Truck Dump was only 15m (50ft). The pressure wave self-cleaning effect, increases as you go down the frequency spectrum. The visual effect of water being removed from the transducer, by an atomising effect, is seen more with the lower frequency 15 kHz, 10 kHz and 5 kHz transducers.

We also utilised a polyurethane / rubber focalizer cone, that improved cleaning and provided better immunity to physical breakage.

The Sultan Range of Acoustic transmitters were supported by the remote HawkLink diagnostic module, that allowed direct factory support.

Ordering Information

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

Application Reference - Sultan Acoustic Wave

Self-Cleaning Acoustic Level Transmitters, For Continuous Measuring of Lime Powder Silos and Lime Slurry Makeup Vessels.

Application Problem

The client had intermittent problems with the supplied radar transmitters for the two vessels, measuring Lime Powder in the silo and Lime Slurry in the makeup vessel. The client was using Lime, as a means of correcting the pH of the return process water at a Coal Washery.

Lime powder, was conveyed into the Silo, using lean phase pneumatic air from the delivery truck. Transporting Lime powder through an airline causes friction and increases the temperature inside the silo. This creates condensation in the top of the silo. Lime is very hydroscopic in nature and the powdered form will take moisture in readily. Any transducers or probes mounted, in the top of the vessel, get coated in Lime powder, which solidities over time. This causes passive Radar transmitters or high level probes to prematurely fail.

Solution

We installed low frequency Acoustic Transducers in the silo and makeup vessel. The self-cleaning Acoustic technology, produces high amplitude pressure waves with each pulse, that prohibits the Lime powder from building up on the operating diaphragm. We used rubber / polyurethane focalizer cones to enhance the cleaning action and to minimise the operating beam angle of the transducers.

The Lime silo, used the more powerful 10 kHz transducer, to provide continuous level control even when the Lime is being “blown” into the silo, creating high dust and turbulence levels. The Lime makeup vessel, was smaller in depth and we supplied a 20 kHz transducer, to counter buildup issues from froth and foam floating on the slurry surface. Both instruments were free of buildup in the focalizer cone and on the diaphragm.

The Sultan Acoustic Transmitter system, comes with a Mine related application selectable menu, to minimise calibration and to simplify the commissioning.

Ordering Information

Lime Silo:

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

Lime Makeup Vessel:

1 x AWR234SUXXXX
Remote Sultan Transmitter

1 x AWRT20T4XXXC15XX
Remote 20 kHz Transducer

1 x C04-8
Rubber / Polyurethane Cone

1 x FA4A-4
Flange 4-00” ANSI

MiniWave Ultrasonic Level Series

Description

The MiniWave Level transmitter has been designed to provide reliable and accurate continuous level measurement for liquid applications.

The MiniWave is HAWK's superior level technology designed for all liquid level applications. Primary applications will be the water / wastewater industry to respond to all competitive threats within this market.

Points of Difference

Why Use MiniWave Ultrasonic Level Series?

Advantages

- Self-Attenuating Gain
- Easy Installation
- Easy Configuration
- Local Display with Loop Powered HART 4-20mA Output
- MiniWave is a compact, loop-powered ultrasonic level transmitter for continuous measurement of liquids.
- As a price leader, it does not compromise on good value; and provides effortless and intuitive operation
- Easy and flexible mounting combined with high chemical compatibility and 12m (40ft) measuring range makes the MiniWave suitable in multiple applications in all industries.

Principle of Operation

The MiniWave emits an ultrasonic pulse, which is reflected from the surface of the liquid being measured. The reflected signal is processed using specially developed software to enhance the correct signal and reject false echoes.

Adaptive sensitivity control allows the unit to dynamically adjust and improve the received echoes for the best possible measurement outcome.

Primary Areas of Application

Liquid Level:

- River level
- Wet wells
- Inlet screens
- Tanks
- Sumps
- Pump stations
- Water towers
- Dams
- Basin levels
- Chemical storage

Features

- 2 wire 4-20mA with HART
- Maximum range to 12m (40ft)
- Non-contact measurement
- Low cost per measuring point
- Auto compensation for steam and signal losses
- Ingress protection class IP67, NEMA 4x
- Adaptive sensitivity control
- Volume linearization to tank shapes or 32 point table (requires PC connection with GosHawk II)
- Automatic temperature compensation.

Centurion Guided Radar

Description

The HAWK range of Guided Radar products are ideal for level measurement of liquids, solids, bulk materials, sludge, powders and granules.

This technology is not affected by pressure, temperature, viscosity, vacuum, foam, dust, changes in dielectric constant or coating of the probe.

Points of Difference

Why Use Centurion Guided Radar?

Advantages

- Measure to a distance of 18.5m (60ft)
- Measure extremely low dielectric constant (1.5) and capable of working with different specific gravities and viscosities
- Factors like surface turbulence, foam, pressure, dust, vacuum, vapors, temperature, dielectric constant, or tank obstructions do not influence the measurement.

Principle of Operation

Guided-wave technology sends the radar pulse down a probe to measure either liquids or solids.

The pulse hits the surface and is reflected back up the probe to the sensor, where the transit time is translated into a distance using time of fight and time expansion.

The amplitude of the reflection depends on the dielectric constant of the product.

Primary Areas of Application

Liquid Level:

- Chemicals
- Petrochemicals
- Cement
- Building Aggregates
- Mining / Minerals
- Food & Beverages
- Oil & Gas
- Pharmaceutical
- Pulp & Paper
- Wastewater

Features

- IECEx Ex d [ia] ia IIC T6 Gb Ga
- Up to 18.5m (60ft 8in) range
- Very short minimum range (150mm, 6”)
- Simple setup
- Auto-Calibration to any dielectric ≥ 1.5
- Adjustable Sensitivity
- Precise & continuous measurement
- 2 wire loop
- 4-20mA, HART Universal / Common practice commands
- Protection class IP66, NEMA 4x
- Measures extremely low dielectric (1.5)
- Programmable fail safe mode

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.

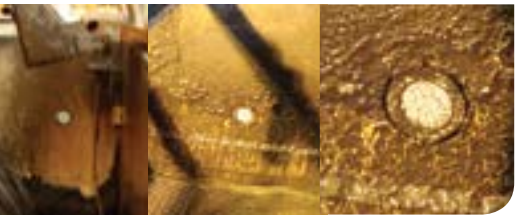
HAWK's Acoustic Wave Transducers are self cleaning. The power of each pulse (pressure wave) blows water, moisture and build-up off the face of the diaphragm.

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

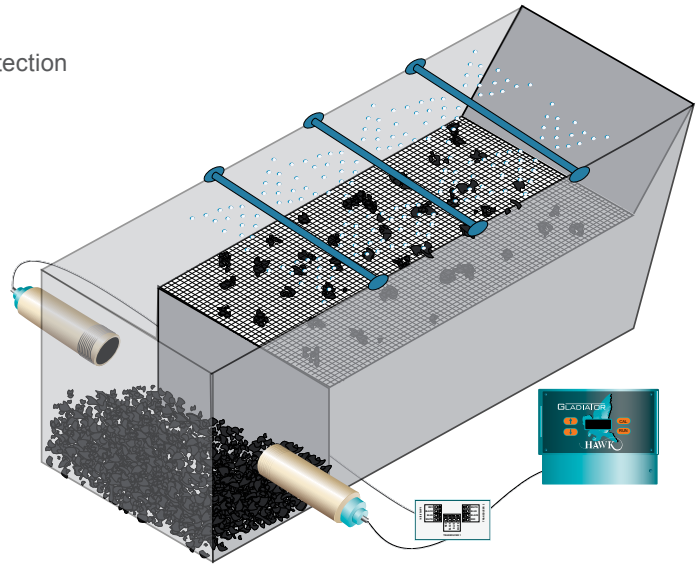
Typical Applications

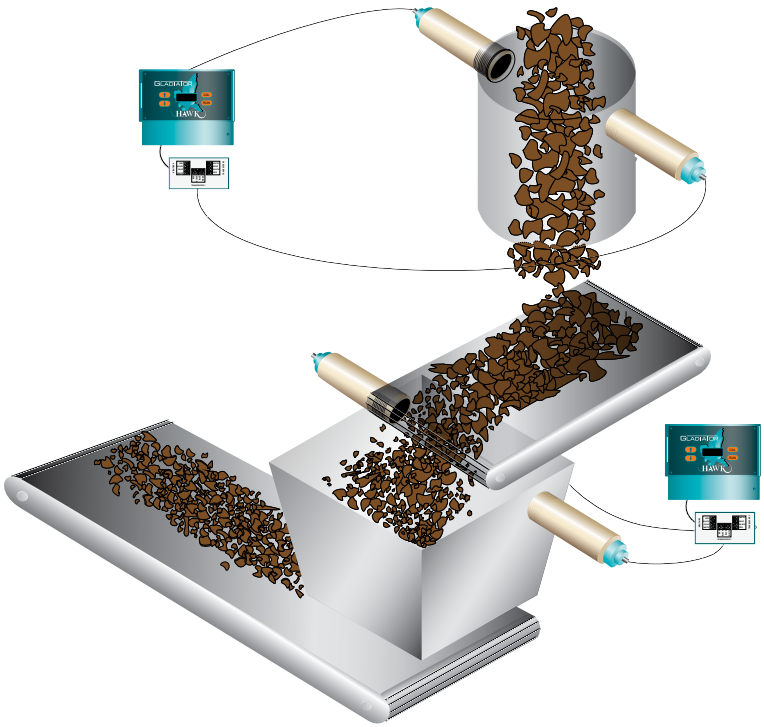


Process Protection - Blocked Chute

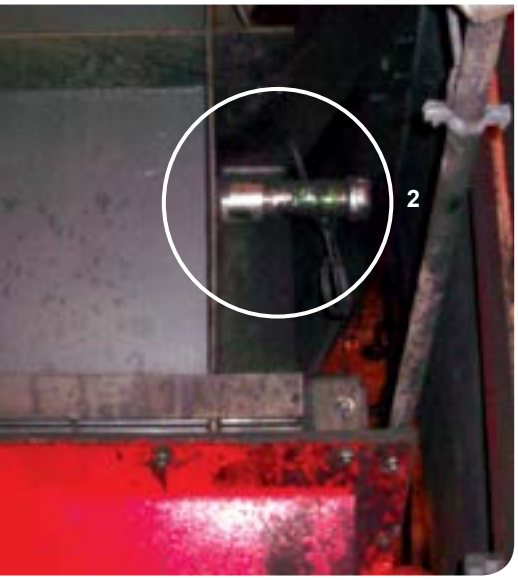
Bulk Solids

- 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

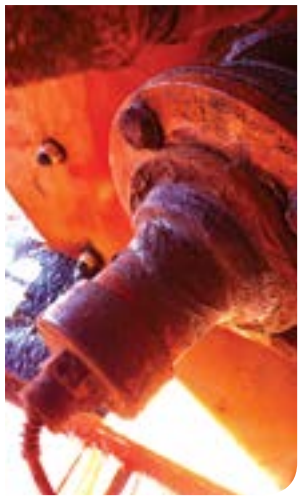
2 x AWRT15Y4XXXC15XAS
15 kHz Titanium face, 15M cable

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 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

Self Cleaning Transducers

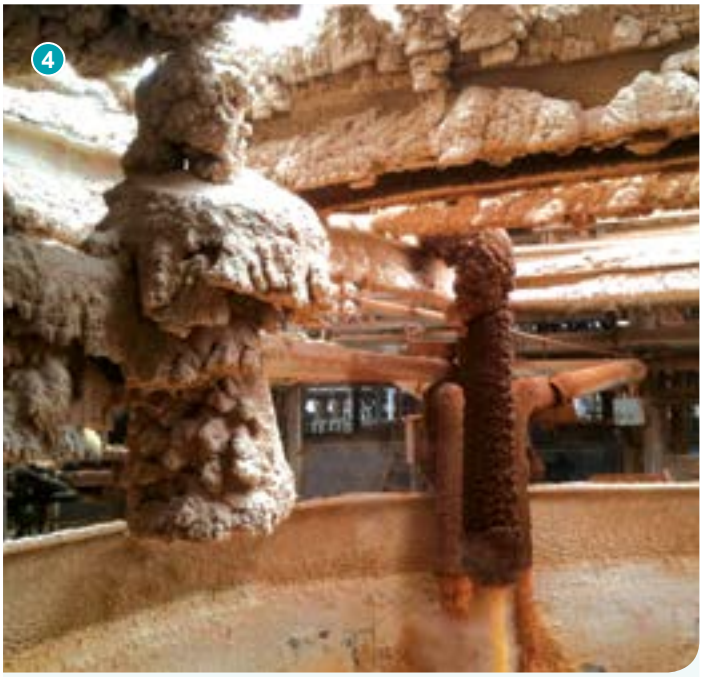
Self Cleaning

Level measurement installations are often mounted in locations that are difficult to access and maintain. HAWK Acoustic Wave products are designed to be 'self cleaning', meaning no maintenance is required. This is a serious problem for industry, and other products require frequent maintenance of the transducer face to continue operation.

Sultan Design

1 After 2 months
2 After 5 months

3 The SULTAN has been Installed for 5 months, and it is **STILL WORKING!**



4 After 18 months, and it is **STILL WORKING!**

Gladiator Gen 3 Microwave Switch Series

Description

The Gladiator Microwave provides point level switching for the presence or absence of solids and liquids in any application where microwave energy is absorbed by the material being monitored.

It is a common replacement of traditional contact switching devices.

Points of Difference

Why Use Gladiator Gen 3 Microwave?

Advantages

- Receiver Gain Sensitivity **INCREASED** by 5525%
- This increase allows for better penetration through product and product build up
- Circular polarization allows for minimal signal loss
- Unwanted reflected signal does not cancel out signal on receiver (can occur with linear polarized units)
- Decreased alignment issues
- Increased capability to penetrate conductive build-up and automatically compensate
- Ability to monitor ambient RF noise and compensate to avoid false trips
- Re-designed electronics and simplified software with advance filters and signal identification
- Application specific predictive diagnostics for maintenance support.

Principle of Operation

A high power circular polarized Microwave pulse is emitted from the Sending unit to the Receiving unit in a transmission chain of approximately 100 pulses per second.

If the path between the Sender and Receiver is blocked by any object or material which absorbs or reflects microwave energy the Receiving unit will no longer detect the complete transmission chain and indicate via Relay or 4-20mA output the change for automatic indication and process control requirements.

Primary Areas of Application

- Asphalt
- Brewing
- Cement
- Chemical
- Dairy
- Edible oil
- Fertilizer
- Food & Beverage
- Glass
- Mining & Metals
- Oil & Gas
- Packaging
- Paint
- Paper
- Pharmaceutical
- Plastics
- Power Generation
- Refining
- Semiconductor
- Sugar
- Textile
- Water & Wastewater.

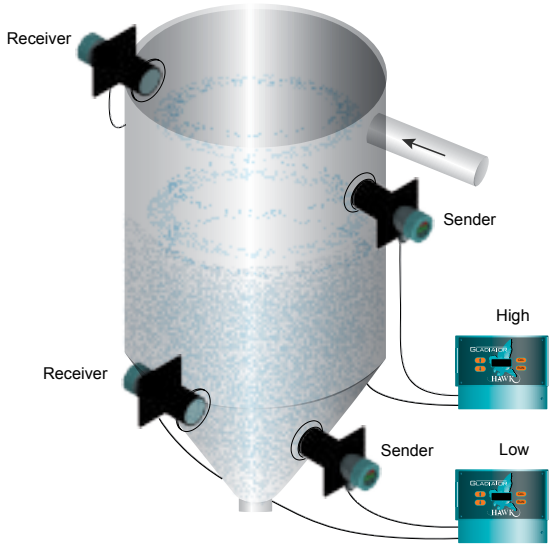
Features

- State of the art Circular transmission
- Backwards compatible with all Gladiator Microwave generations
- LCD push button setup / diagnostics on remote amplifier
- Simple sensitivity adjustment and calibration on Integral system
- Ranges up to 1200m (3937ft)
- Simple ‘1-minute’ setup application pre-sets
- Remote sensor or Integral ‘all in one’ types
- Relay outputs: Integral (1 + failsafe) Remote (2)
- Remote test function
- Adjustable ON and OFF delays (0-20 sec)
- Remote 3G HawkLink connection option
- Remote amplifier to sensor separation up to 500m (1640ft)
- Bright visual status indication on sensors
- Independent housing alignment after mounting sensor.

Typical Applications

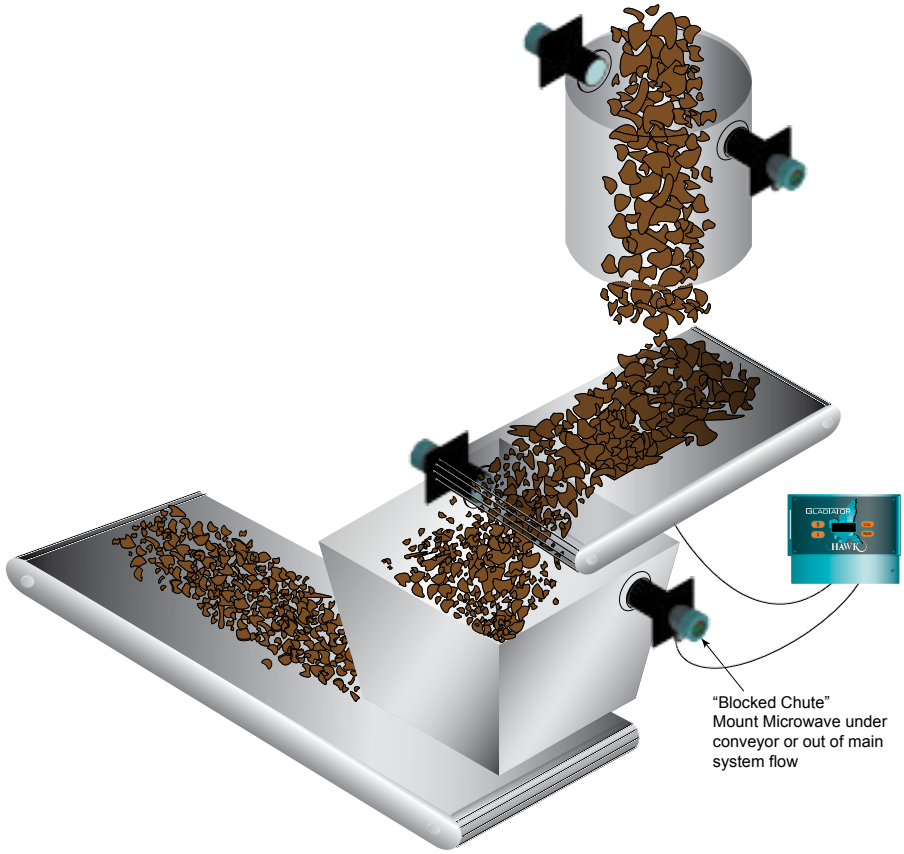
Cement Plants / Powders

Solid Level - cyclone bin high / low level



Coal Fired Power Station, Bulk Material Handling

High / low blocked chute detection



Application Reference - Gladiator Gen 3 Microwave Switch

Reliable Microwave Switches For Boom Protection

Application problem

The customer had previously used lanyard rope switches, to protect the boom on stacker / reclaimers, from coming in contact with stockpiles.

Lanyard rope switches, require high maintenance support, to keep them operational.

If the lanyard rope is not tensioned properly, the system will not work.

Brackets supporting the lanyard rope were frequently bent by the boom coming into contact with the stockpile.

Solution

The long range remote microwave switch was used. One pair each side of the boom, to replace the lanyard rope switch.

The beam angle of the sender was sufficiently wide enough for simple calibration and commissioning, as well as compensating for the boom deflection when under load.

The microwave is not affected by dust, has a robust construction and a special Alignment software mode to simplify commissioning.

Ordering Information

GSASUS - Gladiator Remote Amplifier

GMSB101XX - Remote Microwave Sender

GMRR101XX - Remote Microwave Receiver

2 x CA-GMRR-10M - 10m cable

2 x MA15 Focaliser Tube

G1 Microwave Switch Series

Description

The Gladiator Microwave Switch can be used for blockage detection, barrier detection, machine detection and point level measurement, and detection of objects or material between two points.

Points of Difference

Why Use G1 Microwave?

Advantages

- **INCREASED** Receiver Gain Sensitivity
- This increase allows for better penetration through product and product build up
- Circular polarization allows for minimal signal loss
- Unwanted reflected signal does not cancel out signal on receiver (can occur with linear polarized units)
- Decreased alignment issues
- Increased capability to penetrate conductive build-up and automatically compensate
- Ability to monitor ambient RF noise and compensate to avoid false trips
- Re-designed electronics and simplified software with advance filters and signal identification
- Application specific predictive diagnostics for maintenance support.

Principle of Operation

A high power circular polarized Microwave pulse is emitted from the Sending unit to the Receiving unit in a transmission chain of approximately 100 pulses per second.

If the path between the Sender and Receiver is blocked by any object or material which absorbs or reflects microwave energy the Receiving unit will no longer detect the complete transmission chain and indicate via Relay for automatic indication and process control requirements.

Primary Areas of Application

- Asphalt
- Brewing
- Cement
- Chemical
- Dairy
- Edible oil
- Fertilizer
- Food & Beverage
- Glass
- Mining & Metals
- Oil & Gas
- Packaging
- Paint
- Paper
- Pharmaceutical
- Plastics
- Power Generation
- Refining
- Semiconductor
- Sugar
- Textile
- Water & Wastewater.

Features

- State of the art circular polarisation
- Simple sensitivity adjustment and calibration
- Theoretical range up to 300m (984ft)
- Simple ‘1-minute’ setup application presets
- Relay outputs: Integral (1 + failsafe)
- Remote test function
- Adjustable ON and OFF delays (0-20 sec)
- Remote 3G HawkLink connection option
- Bright visual status indication on sensors
- Independent housing alignment after mounting sensor.

Application Reference - G1 Microwave Switch

Fertilizer Blending Flow Switch

A fertilizer manufacturer using HAWK's new Circular Polarized Microwave has improved their process. The fertilizer manufactured consists of a base fertilizer with additives blended in the process to meet formulated recipes. This blending occurs at load-out and it is important to get the ratios correct.

Application problem

The current method of measuring the flow of additive is a load cell with a flapper arrangement on the side of the screw conveyor to measure force when product is flowing. The load cells are sensitive to pick up slight movement, however because of the sensitivity needed, they often fail because of corrosion or mechanical damage. This can stop production or worse, send a signal that a blend is getting an additive when it's not. The team at manufacture went in search for an alternative.

Solution

G1 Microwave being used as a flow / no flow switch. In this application we are looking for the inverse of a blocked chute. The set up was to tune the Gladiator Microwave at its most sensitive to detect if product was present or absent. The aim was to detect the fall curtain.

Technical issues

HAWK had to manufacture a set of 316 SS microwaves as the environment is very chemically aggressive. The photo's show all equipment wrapped up in Denso tape. The G1 Microwave would not trigger at first in a low flow situation. The beam spread was thought to be too wide and going around the product to make the connection with the receiver. The client installed a short section of stainless steel pipe to act as a wave guide and focus the beam. This produced repeatable results. The client plans to fit out the remaining hoppers as capital allows.

Ordering Information

G1 Microwave:

G1SCBTNX - Sender

G1RCBTNX - Receiver

Qty 2: MA2-UW

ORCA Sonar System

Description

The ORCA Sonar will measure up to two density interfaces simultaneously. Typically these are bed level / RAS blanket and floc / fluff layer.

The ORCA produces a high power concentrated sonar beam, and has high sensitivity for detecting returned signals.

Points of Difference

HAWK's ORCA Sonar System

Traditionally, Sonar Technology has only been used in water clarifiers. The ORCA can be used in all applications from water clarifiers to mining thickeners.
This product has won three awards - *Product Innovation Award (Water), Product of the Year, and Processing's Breakthrough products* respectively.

Why Use ORCA Sonar System?

Advantages

Improved Underflow
Drier product: Improved water recovery and greater dam life.
More reliable product: Downstream processes operate more efficiently with a consistent feed flow, head pressure and water content.
Increased thickener capacity: If a thickener is optimised more product can be processed through it.
Reduced process downtime: A more efficient thickener can process more so there is less likelihood of slowing upstream processes.

Overflow Clarity Improvements
Water is recycled back into the plant. Carryover from poorly operated thickener is a major source of process water solids. Since process water is used in every aspect of the plants operation significant maintenance costs are incurred i.e. Rapid deterioration of glands on pumps.

Chemical Control
Optimising chemicals usage saves reagent costs and reduces residuals in the system which can interfere with other chemical processes. Flocculent will blind filter cloth resulting in maintenance downtime.

Improved Operator Effectiveness
Operator time is freed up. There is no need to control operations which are automatically adjusted.

Principle of Operation

The ORCA Sonar Series transducer emits a high powered low frequency pulse, which is reflected from the interface density selected.

The reflected signal is processed using specially developed software algorithms, that eliminate lighter floating densities and stratified layers, allowing measurement of Bed or RAS levels.
It can be calibrated to measure lighter densities such as the hindered / free settling layer & floc or one of the outputs could be used for a "Clarity" output, similar to a basic turbidity transmitter measuring solids in suspension.

Primary Areas of Application

Mining / Process:

- Concentrate Thickeners
- Tailings Thickeners
- Hi-Rate Thickeners
- Paste Thickeners
- Deep Cone Thickeners
- Thickeners
- CCD's
- Settling Ponds / Lagoons
- Water Treatment
- Carbon Columns.

Features

- Dual independent analogue outputs to track two different interfaces, or clarity simultaneously, with the one sonar sensor
- Easy calibration to track specific density interfaces, eg: floc / fluff layer - 1g/l, Bed 10g/l+
- Industrial scum cleaning mechanisms, that do not require maintenance
- No wiper blade assemblies
- Control room graphics of tanks and interfaces via GosHawk II
- Wide range of communications: Modbus, HART, Foundation Fieldbus, DeviceNet, Profibus DP and Profibus PA
- 3G remote support capability for calibration, commissioning or technical back-up
- 3 programmable relays
- Full compatibility with AWRTS Sultan Sonar Transducers.

A Breakthrough Sonar Transducer For Level Control

HAWK has produced the ORCA sonar range, to control process tanks in the water and waste water industry. Most other vendors' sonar products are good for monitoring purposes only.

HAWK has the largest range of sonar transducers that guarantee performance from water treatment, waste water treatment through to heavy industrial mining applications. HAWK can demonstrate that by using the ORCA sonar range to control RAS blankets in secondary clarifiers or bed levels in thickeners, that the payback on the equipment and savings to the plant happen very quickly.

Typical Applications

Area	Functions
Mining / Mineral processing	
Clarifier Tank	Blanket level / clarity suspended solids / stratified floc layers
Thickener Tank	Sludge bed level / clarity suspended solids / stratified floc layers
CCD's Tank	Sludge bed level / clarity suspended solids / stratified floc layers
Settling Ponds	Sludge bed level
Industrial (food, paper etc.)	
Primary Sedimentation Tank	Sludge blanket level
Secondary Clarifier Tank	RAS blanket level / clarity suspended solids / rag / pinfloc layer
Thickener Tank	Sludge bed level / clarity suspended solids / floc level
"DAF" Tank	Sludge bed level / floating sludge level
Sequential Batch Reactor (SBR)	Settling blanket level / RAS bed level
Carbon Column	Carbon bed level

Typical Applications

Thickener Tanks

Tailings Thickeners

Paste Thickeners

Gravity Thickeners

Concentrate Thickeners

As thickeners are generally used after primary or secondary settlement the product density measured is in the range of 6000-8000 mg/ltr.

HAWK's range of low frequency multi-array transducers allow penetration through a high concentration of suspended solids and can therefore be used to optimize the density of sludge which is pumped back to the filter presses or digesters.

The second output from the ORCA Sonar can also be used for an indication of water clarity (suspended solids) or to track the hindered layer to provide either a pre-warning of process problems or to activate automatic dosing operations.

The unique cleaning mechanism using the 'shear' action principle prevents build up of scums and debris on the transducer face to maintain optimum performance.

Application Reference - ORCA Sonar System

Reliable Bed Level Control and Water Clarity Monitoring In Paste Thickeners.

Application Problem

The client had a problem to monitor a bed level in a Paste Thickener where the suspended solids turbidity changed frequently.

The older sonar system failed when high levels of suspended solids were present. There were high levels of scale build-up, due to the water quality used.

Solution

HAWK installed a high powered low frequency sonar transducer developed for the mining industry that would penetrate the suspended solids in the worst scenario.

The high powered sonar was able to monitor in the “hindered” zone which is just above the “compacted” zone of the bed. The sonar system was supplied with an automated scum cleaner, that operated every 5 minutes.

The ORCA sonar transmitter provided two analogue outputs. The first was the “bed level” output and the second was the “clarity” of the water (suspended solids) between the sonar transducer diaphragm and the bed level.

The “clarity’ was used as an alarm for the control room to monitor the polymer dosing when the water clarity was low.

Ordering Information

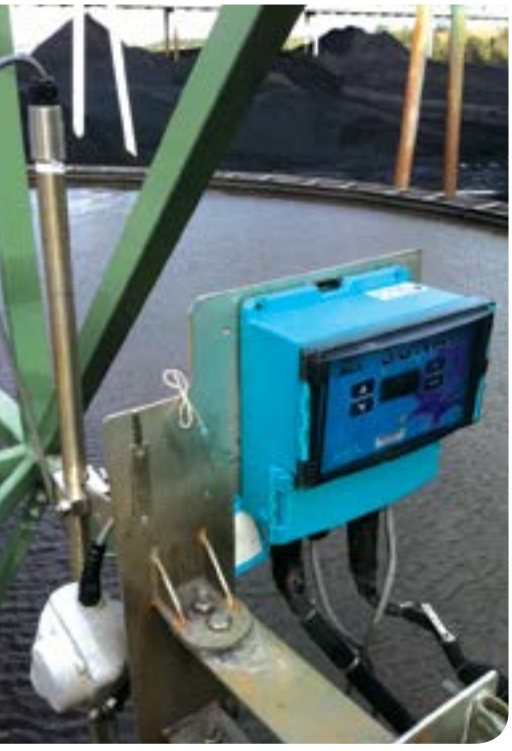
Transmitter part number:
OSIRDYX - ORCA Remote Transmitter with dual analogues

Transducer part number:
OSIRT302SHXC6 - ORCA Remote Transducer

OSIRSCA - Scum Cleaner

OSIRME-L3 - Bracket / Pipe

Application Reference - ORCA Sonar System



Tailings Thickeners - Coal.
Improving The Efficiency of The Tailings Thickener In A Coal Prep Plant.

Application Problem

The customer had multiple coal types, that they processed through the coal prep plant. Some of the coal types had different settling characteristics. This affected the tailings thickener efficiency and the “clarometer” instrument that tested settling rates in the incoming feedwell, failed from time to time, which meant that the floccing rate changed and the suspended solids increased, decreasing the quality of the return water back to the prep plant.

Solution

We provided a high powered low frequency sonar transducer with automatic scum cleaning impact plate.

The two outputs of the sonar system provided:

1. BED Level (Heavy density compacted interface)

2. Hindered / fluffy layer (low density interface)

1. This heavier ‘BED” level output, was used as one of the input loops, to control the underflow pump, guaranteeing an optimized density being pumped to the tailings dam.

2. The hindered / fluffy layer was used to monitor the deviation distance between it and the heavier compact bed. As the deviation moved greater than a set distance flocculent dosing increased. As the deviation decreased flocculent dosing decreased.

The high powered low frequency transducer, penetrated the suspended solids, even under poor settling conditions. The hindered / fluffy layer output could also be used, in the floc dosing control loop to automate this function if the “clarometer” failed.

Ordering Information

Transmitter part number:
OSIRDYX - ORCA Remote Transmitter with dual analogues

Transducer part number:
OSIRT302SHXC6 - ORCA Remote Transducer

OSIRSCA - Scum Cleaner

OSIRME-L3 - Bracket / Pipe

Sultan Sonar System

Description

Sonar interface design propagates a high frequency sound pulse from a submerged transducer to the interface or bed level . The pulsed sound signal is reflected back from the bed level or interface surface and calculates the time of flight

The returned sonar signal is interpreted by the transducer, compensates for temperature, and provides for a distance reading and output, proportional to the distance between the transducer and the material.

Points of Difference

HAWK's Sultan Sonar System

- Reduce Sludge Pumping
- Optimize Chemical Dosing
- Advance Warning of Process Upset
- Free Personnel For More Critical Functions
- Automate Clarifier / Thickener Control
- Eliminate Problematic Hand Measurements.

Why Use Sultan Sonar System?

Advantages

- Provide a control to the flocculent bed level in the clarifier so as to optimize the quality of the water flowing over the launders
- Provide an alarm status as flocculent floats to the surface
- Reduces manpower and adds automation to the process
- Optimized bed density being pumped to the filter presses
- Reduces the run time of the filter presses, lower running costs.

Chemical Control

Optimising chemicals usage saves reagent costs and reduces residuals in the system which can interfere with other chemical processes. Flocculent will blind filter cloth resulting in maintenance downtime.

Improved Operator Effectiveness

Operator time is freed up. There is no need to control operations which are automatically adjusted.

Principle of Operation

The HAWK Sultan Sonar uses high power, low frequency to measure and control Waste Water Clarifiers. The system is easy to use and the innovative design provides critical plant control to optimize performance.

In the water, wastewater industry process conditions will vary greatly between a primary sedimentation tank, secondary / final clarifier, secondary RAS blanket, flocculent blanket etc, all have different densities and the water above these interface levels are subject to different process conditions that change.

To optimize performance in each interface application under all process environments:

HAWK has developed a powerful low frequency transducer to penetrate through the suspended solids and capable of measuring the sludge bed level at the bottom of a clarifier or the lightest flocculent layer.

To optimize performance under all process environments in each interface application:

HAWK uses one transducer with a frequency and power level that is applicable to the density of the interface and process conditions expected in the tank. Also, HAWK can guarantee performance for controlling pumps etc, rather than for monitoring purposes only.

Primary Application Areas

Water & Wastewater:

- Primary Sedimentation – Blanket level
- Secondary and Final Clarifiers – RAS Blanket layer
- Sequential Batch Reactors – Blanket monitoring (floating sonar)
- Lagoons – Sludge Bed Level
- Lamella Clarifier – Sludge Bed Level
- Filtration
- Gravity Filtration
- Gravity Settling.

Features

- User friendly configuration to track specific densities
- Tune Sensor to 5 preset factory densities or fine tune to the required density in-situ
- Sonar transducer developed to optimize detection of heavy and light density interfaces
- Easy calibration to track specific density interfaces, eg: RAS blanket - 4g/l, floc / fluff layer - 1g/l, Bed 10g/l+
- Industrial scum cleaning mechanisms that do not require maintenance
- No wiper blade assemblies
- Wide range of communications: Modbus, HART, Foundation Fieldbus, DeviceNet, Profibus DP and Profibus PA
- 3G remote support capability for calibration, commissioning or technical back-up from HAWK Service Engineer
- 5 Programmable relays
- 1640 feet (500 metre) separation possible between transducer and Sultan Sonar transmitter
- Transducer frequency range from 151 kHz to 700 kHz.

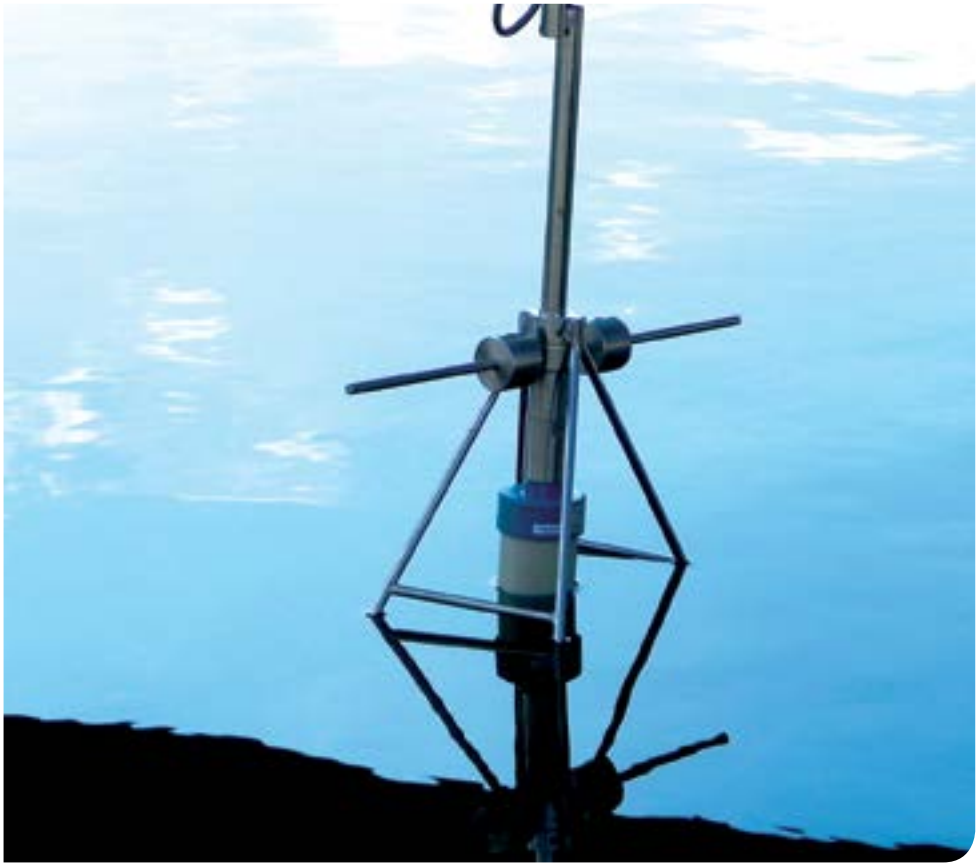
Typical Applications

Primary & Secondary Clarifier interfaces, RAS, Bed / sludge level

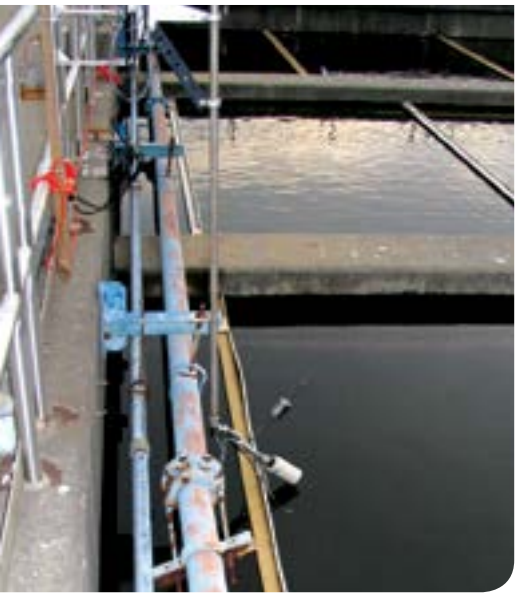
In the water, waste water industry process conditions will vary greatly between a primary sedimentation tank, secondary / final clarifier and a gravity thickener. Thickener bed levels, secondary RAS blanket, flocculent blanket etc, all have different densities and the water above these interface levels are subject to different process conditions that change. To optimize performance in each interface application under all process environments we choose the Sultan Sonar with the versatile 150 kHz transducer.

To optimize performance under all process environments in each application the customer programmed each unit based on the interface reference table for Bed, RAS and the lighter settling layers. The transducers are automatically calibrated to monitor the specific application type. The customer also had the option of fine tuning the depth of the return signal by using the 'Fine Adjustment' setting. One transducer type will cover the density range of the interface and process conditions expected in all the tanks.

The powerful 150 kHz transducer will measure down to the sludge bed layer or up to the light flocculent layer using the industry leading receiver circuitry and advanced echo / signal filters. The impact plate scum cleaner is maintenance free and uses the surface sweeper mechanism common to most tanks to tilt and drop the transducer, using gravity to keep the sensor face clean without interrupting the measurement.



Application Reference - Sultan Sonar System



Reliable sonar level technology for secondary and final clarifiers, controlling “RAS” blanket level.

Application Problem

The customer at a very large waste water treatment plant in the USA wanted to improve control of the “RAS” density being returned to aeration and to the thickeners from the rectangular secondary clarifier.

The average “RAS” density returned was too low at different times, caused by reduced plant inflow and upset process conditions. Low density “RAS” returned to aeration reduced retention times. Low density “RAS” caused the thickeners bed level density to drop, producing a problem downstream to the digesters and filter presses. Surface scum collectors moved along the surface of the tanks.

Solution

HAWK installed an Sultan Sonar transmitter with an impact plate that would raise the sonar transducer over the scum collectors. The sonar transducer was programmed to match to the “RAS” density that the client wanted to monitor.

The Sultan Sonar transmitter would monitor an interface density of 4000 mg/litre, even in unsettled conditions. A 4-20mA output was provided for the depth & height of the “RAS” interface in the tank output.

Ordering Information

AWR234SUXXXX

Remote Sultan Transmitter

AWRTS002S4XC6

Sultan Sonar transducer

IMPACT-PLATE

Auto scum cleaner impact bracket

Gladiator Admittance Smart Switch Series

Description

The Gladiator Admittance Smart Level Switch is designed to detect the level of liquid, slurry or powder in a tank or vessel.

The unit measures the capacitance or “admittance” between a probe and the wall of the container. Operates in tough industrial environments and has an excellent immunity to product build-up.

Points of Difference

HAWK’s Gladiator Admittance Switch

The dielectric constant of the material in the vessel will be different to that of air.

When the material comes near or in contact with the probe an admittance change will occur.

The resonant frequency of the internal oscillator will then change. The relay will switch when the frequency reaches the user selected Switch Point value.

Why Use Gladiator Admittance Switch?

Advantages

- Simple calibration
- Suitable for abrasive media
- Very robust probe
- Suitable for a wide range of materials.

Principle of Operation

The probe of the Admittance Switch forms one plate of a capacitance circuit, with the vessel wall making the second plate. The dielectric constant of the product between the probe and the vessel wall will cause a change of capacitance as the level approaches the probe.

The change is detected, amplified and used to switch a relay for indication or control purposes. A special circuit is used to ignore product build-up between the sensing probe (active element) and guard, and also between the guard and vessel wall.

Primary Areas of Application

- Asphalt
- Brewing
- Cement
- Chemical
- Dairy
- Edible oil
- Fertilizer
- Food & Beverage
- Glass
- Mining & Metals
- Oil & Gas
- Packaging
- Paint
- Paper
- Pharmaceutical
- Plastics
- Power Generation
- Refining
- Semiconductor
- Sugar
- Textile
- Water & Wastewater

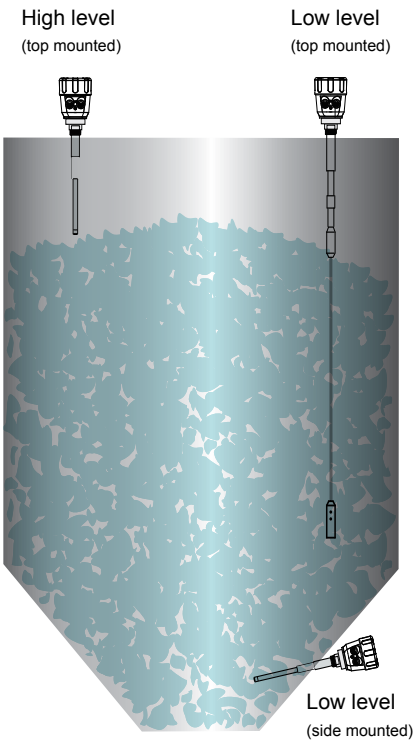
Features

- Excellent immunity to product build-up
- Excellent temperature stability - no false trips
- Non contact switching possible with many products
- Simple ‘1-minute’ setup
- Remote sensor or Smart ‘all in one’ types
- Relay outputs: Smart probe (1) Remote (2)
- Remote test function
- Adjustable ON and OFF delays (0-20 sec)
- Remote 3G Connection option
- Remote amplifier to probe separation up to 500m (1640ft)
- Bright visual status indication on Probe
- Independent housing alignment after mounting thread locked.
- Temperature to 450°C (842°F)

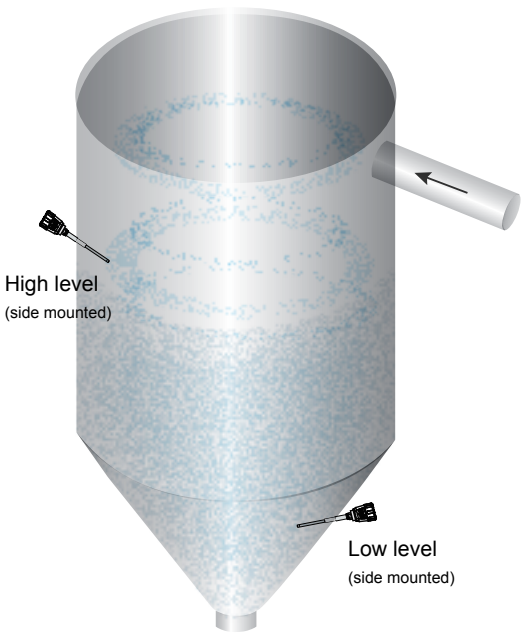
Typical Applications

1. Continuous filling with build-up on probe
2. High level switch in grain application

High and Low Level Switch In A Hopper



Cyclone Bin Level Switch



Application Reference - Gladiator Admittance Switch

Reliable Level Measurement In Dusty Fly Ash Hoppers.

Application Problem

There is a need in the power industry to measure the bin level inside fly ash hoppers under an electrostatic precipitator. These hoppers are usually ganged together per generating unit, in arrays from 4 to 32 depending on unit capacity. It is important that a properly maintained level monitoring system be implemented to prevent material from backing up in the hopper and damaging the precipitator, reducing precipitator efficiency or both. Several properties of fly ash present difficulties in applying process instrumentation correctly: repose angle, temperature, dielectric constant, material buildup and space limitations are the most prominent.

Solution

Historical Solutions

Typically the power industry has focused on using radiometric (gamma) or capacitance type devices. The radiometric device provides a non-contact method of measurement, the radiation passes through the sidewall of the hopper to a detector on the opposite side. This eliminates material properties from affecting the level measurement and gives a relatively simple installation. The drawback to radiometric devices centers around the cost of ownership – documentation, periodic testing, training and maintaining a site Radiation Safety Officer (RSO) is normally required, along with disposal costs which can exceed original purchase price.

Traditional capacitance devices provided a lower cost alternative with limited success. The low dielectric constant of Fly Ash and the temperature extremes make reliable setting of a traditional capacitance probe difficult. The sensitivity needed for low dielectric product detection often leaves the probes in a state where false triggers can be caused with changes of temperature.

HAWK uses the Gladiator Admittance switch product line to provide a reliable and robust solution to the problem of detecting fly ash levels, without the need for the regulatory, safety and administrative concerns which are raised when using radiometric (gamma / nuclear) devices.

The Gladiator Admittance series extends the performance of capacitance and RF probes greatly through use of an extremely stable oscillator core which exhibits almost no drift with process temperature changes. High stability allows higher sensitivity to be used when setting switch points, and so greatly improves the ability to reliably detect products having lower dielectric constants. High temperature ceramic insulation is used in the construction of the Gladiator heavy duty probe for fly ash applications, and the rugged 36mm stainless steel sensing element will withstand heavy impact loads without bending or damage. Lighter duty versions and Teflon insulated versions are also available for less demanding process conditions.

Ordering Information

Remote System: GSASUS with AS2200S141TB15XP60
(500mm insertion, heavy duty ceramic insulated probe suitable for 450 deg. C)

Smart Integral unit: AS2100USS141TB15XP60
(500mm insertion, heavy duty ceramic insulated probe suitable for 450 deg. C)

Gladiator Conductivity Smart Switch Series

Description

Gladiator Conductivity switches are suitable for most applications that involve a conductive liquid, including food and beverage processing, chemical, oil and gas, paint, paper, pharmaceutical and water / wastewater treatment plants.

Points of Difference

HAWK's Gladiator Conductivity Switch

The probe of the Conductivity Switch forms one part of an electric circuit, with the vessel wall or a reference probe making another part.

A conductive liquid between the probe and the vessel wall (or between the probe and the reference probe) links the two parts of the circuit and the output will switch in response. The output has adjustable hysteresis and delays for 'on' or 'off' switching.

Why Use Gladiator Conductivity Switch?

Advantages

- Cost-effective solution for multiple conductive liquid applications
- Ideal for stand-alone pump control
- Built-in electronic insert or remote electronics
- No calibration required
- No moving parts means long service life.

Principle of Operation

A low voltage AC signal is applied between the probe electrode and the tank wall or reference electrode in the case of a non-metallic tank.

When the liquid comes into contact with the electrode tip, a conductive path is established between the sense electrode and the metallic tank wall / reference electrode.

Current flow due to the conductive path is sensed, amplified and used to switch a relay for indication or control purposes.

Primary Areas of Application

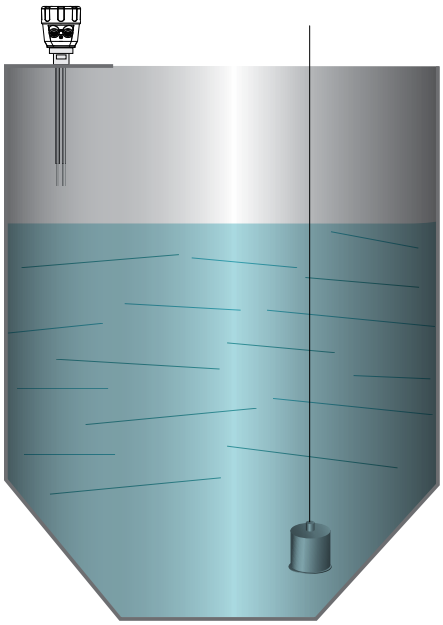
- Brewing
- Chemical
- Dairy
- Edible Oil
- Fertilizer
- Food & Beverage
- Glass
- Mining & Metals
- Oil & Gas
- Packaging
- Paint
- Paper
- Pharmaceutical
- Power Generation
- Refining
- Semiconductor
- Sugar
- Textile
- Water & Wastewater.

Features

- No moving parts - low maintenance
- Low voltage on probe for operational safety
- Simple '1-minute' setup
- Remote sensor or Smart 'all in one' types
- Relays outputs:
  Smart probe (1)
  Remote (2)
- Remote test function
- Adjustable ON and OFF delays (0-20 sec)
- Smart communication options: GosHawk, Modbus, HART, Profibus DP, DeviceNet
- Remote GSM Connection option
- Remote amplifier to probe separation up to 500m (1640ft)
- Bright visual status indication on probe
- Independent housing alignment after mounting thread locked.

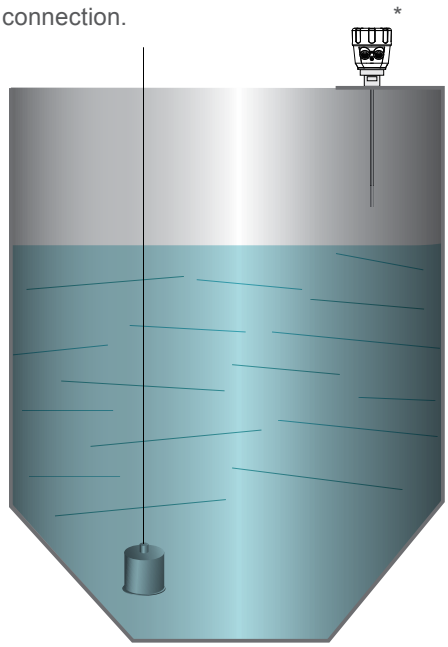
Typical Applications

Non-metallic Tank



Metallic Tank

*Mounting must be electrically connected to tank wall for a single rod probe to work. Dual probe will work without electrical connection.



Gladiator Vibration Smart Switch Series

Description

The Gladiator Vibration Smart Switch is a third generation, state-of-the-art level probe, designed to operate in tough industrial environments.

Gladiator Vibration switches are for a wide range of liquids and solids. This type of switch is suitable for many situations requiring level detection, including pump control, high or low-level alarms for presence / absence of material.

Points of Difference

HAWK's Gladiator Vibration Switch

The forks of the vibration switch are driven to vibrate like a 'tuning fork'. When material touches the forks, their vibration is changed and output will switch in response. The output has adjustable hysteresis and delays for 'on' or 'off' switching.

A test function is available to remotely confirm the probe integrity by switching the relay contacts.

Why Use Gladiator Vibration Switch?

Advantages

- No moving parts
- Not sensitive to external vibrations
- Not affected by build-up.

Principle of Operation

A stainless steel tuning fork is driven by piezo ceramic elements, causing it to vibrate at its resonant frequency.

When the material to be detected covers the fork, vibrations are damped.

The changed vibration is sensed electronically, and the processed signal is used to switch a relay for indication or control purposes.

Primary Areas of Application

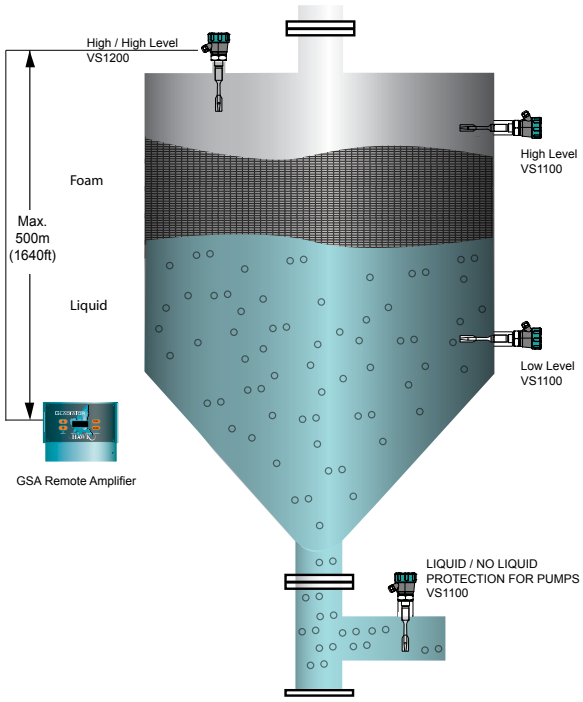
- Brewing
- Cement
- Chemical
- Dairy
- Edible oil
- Fertilizer
- Food & Beverage
- Glass
- Mining & Metals
- Oil & Gas
- Packaging
- Paint
- Paper
- Pharmaceutical
- Plastics
- Power Generation
- Refining
- Semiconductor
- Sugar
- Textile
- Water & Wastewater

Features

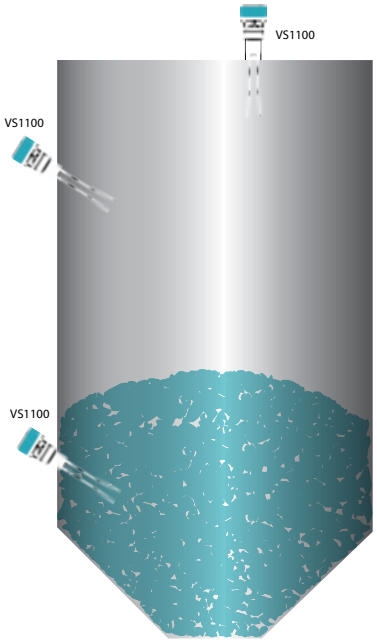
- Suitable for a wide range of solids and liquids
- Heavy duty construction
- Simple '1-minute' setup
- Remote sensor or Smart 'all in one' types
- Relay outputs:
  Smart probe (1)
  Remote (2)
- Remote test function
- Adjustable ON and OFF delays (0-20 sec)
- Smart communication options:
  GosHawk, Modbus, HART, Profibus DP, DeviceNet
- Remote GSM Connection option
- Remote amplifier to probe separation up to 500m (1640ft)
- Bright visual status indication on probe
- Independent housing alignment after mounting thread locked

Typical Applications

High and Low Liquid Level Switch In Tanks



High and Low Level Switch In Hopper



Application Reference - Gladiator Vibration Switch

Reliable Level Measurement of Plastic Granule / Powder Silos and Bins.

Application Problem

The client had been looking for reliable level measurement in plastic granules and plastic powder silos that were pneumatically filled.

The problem was during filling the existing level transmitters would lose their signal.

Solution

We installed a low frequency 20 kHz transducer to track the level. The unit to ensure an accurate output to the PLC penetrated the dust and turbulence during filling.

We also installed high level Gladiator Vibration switches as a failsafe high switch.

Ordering Information

Level part number:
AWR234SUXXXX
AWRT20T4XXXC15XX
C04-4
FA4A-4

Switch part number:
VS1100USS11STN10XP26

RS4000 Rotation Switch Series

Description

The Rotating Switch vane is driven by a slow speed synchronous geared motor.

For safe and multi-purpose level monitoring in all types of containers and silos.

It can be used with all bulk materials and powders as a point switch.

Points of Difference

Why Use RS400 Rotation Switch?

Advantages

- Universally applicable as a full, empty and demand alarm on silos containing solids
- Proven principle
- Simple operation.

Principle of Operation

The rotating measuring vane is driven by a brushless synchronous motor.

Once the material level reaches the vane, it stops rotating, which is detected by a micro switch to stop the motor and switch the level output.

Once the material level begins to fall and the vane is free of material the motor will restart and the vane will rotate again.

Primary Areas of Application

Plastic Industry:

Powder, Granular, Pellets and etc.

Building Industry:

Lime, Styrofoam, Molding Sand, Urea, Cement, Gypsum, Crushed Rock

Food Industry:

Milk Powder, Flour, Salt, Sugar, Minerals, Herbs, Grain

Paper & Pulp Industry:

Wood Chips, Saw Dust and etc.

Chemical Industry:

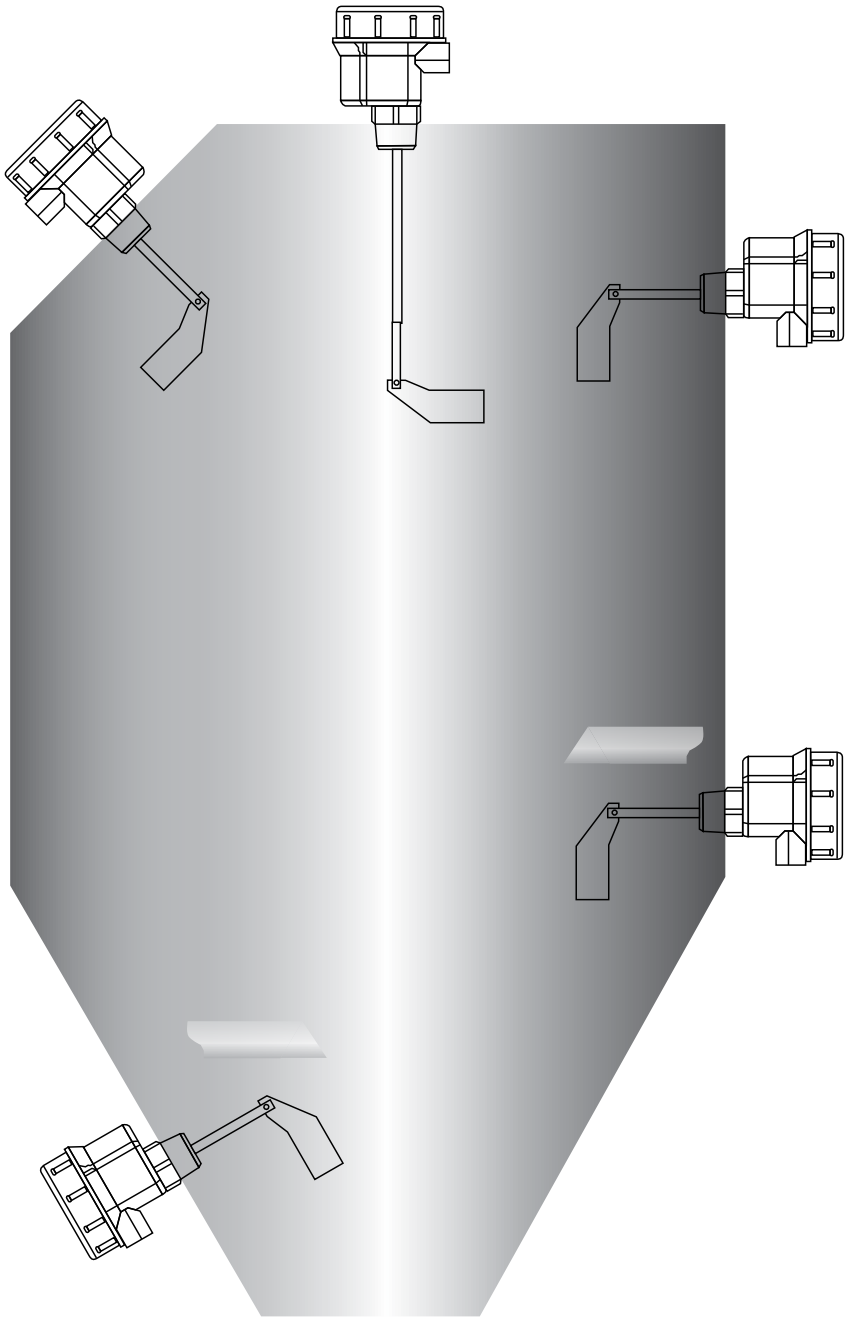
Rubber, Coating, Foam

Features

- ATEX and FM approvals for use in dust explosion areas
- No calibration
- High reliability
- Robust
- Wide range of applications
- Enclosure rating IP66 / NEMA 4
- Friction clutch:
  protects gears against mechanical blows to the vane
- Two different probe lengths
- Selectable sensitivity for low density powders.

Typical Applications

High or Low Level Detector In Containers and Silos.



Gladiator Pump Protection Switch

Description

The Gladiator Pump Protection switch can be used in applications where pipe or wall mounting with minimal protrusion is required.

It can also be used to detect the presence of liquids to ensure the pump will never run dry.

Points of Difference

Why Use Gladiator Pump Protection Switch?

Advantages

- The simple and reliable solution
- Suitable for sticky or viscous products which may create a conductive build-up on the wall of the pipe
- Suitable for a variety of products which may be pumped in the same pipe.

Principle of Operation

The probe of the Pump Protection Switch forms one plate of a capacitance circuit, with the vessel wall making the second plate.

The dielectric constant of the product between the probe and the vessel wall will cause a change of capacitance as the level approaches the probe.

The change is detected, amplified and used to switch a relay for indication or control purposes. A special circuit is used to ignore product build-up between the sensing probe (active element) and guard, and also between the guard and vessel wall.

Primary Areas of Application

The switch has immunity to build-up and monitor materials with a wide range of dielectric constants, so the system is applicable to a large variety of liquids.

Sultan CraneMaster Anti-Collision Systems

Description

The Sultan CraneMaster Anti-Collision system offers major advantages when control and position functions are required for large moving machinery.

Points of Difference

Why Use Sultan CraneMaster Anti-Collision System?

Advantages

- Immune to dust, particles in suspension, fog, rain
- Self-cleaning and ensures that the face of the units always remains clean
- Can use Flexible Polyurethane cones that are immune to rock impacts etc.

Typical Systems

5 kHz and 10 kHz systems will not crosstalk for purposes of mounting more than one unit on a single machine.

5 kHz
- AWR234SUXXXCM
- AWRT05S4XXXC6XX
- C10-05-4
- FA10A-4

10 kHz
- AWR234SUXXXCM
- AWRT10S4XXXC6XX
- C10-10-4
- FA10A-4

Principle of Operation

The Sultan CraneMaster utilises specially designed transducers that are unaffected by either high wind or rain. HAWK transducers are the most powerful transducers available. The system can employ two separate frequencies to eliminate the cross talk problems associated with other such products. The dual frequency approach allows for greater reliability and a much faster response time, which provides a greater level of confidence in the operation of the system.

The Sultan CraneMaster series emits a high powered acoustic wave transmit pulse which is reflected from the adjacent crane or impeding obstacle

The reflected signal is processed using specially developed software to enhance the correct signal and reject false or spurious echoes.

The CraneMaster automatically detects approaching cranes and can be programmed with up to 5 distance based relay alarms for collision, slow down warnings etc as well as continuous distance monitoring via 4-20mA or industry standard protocols.

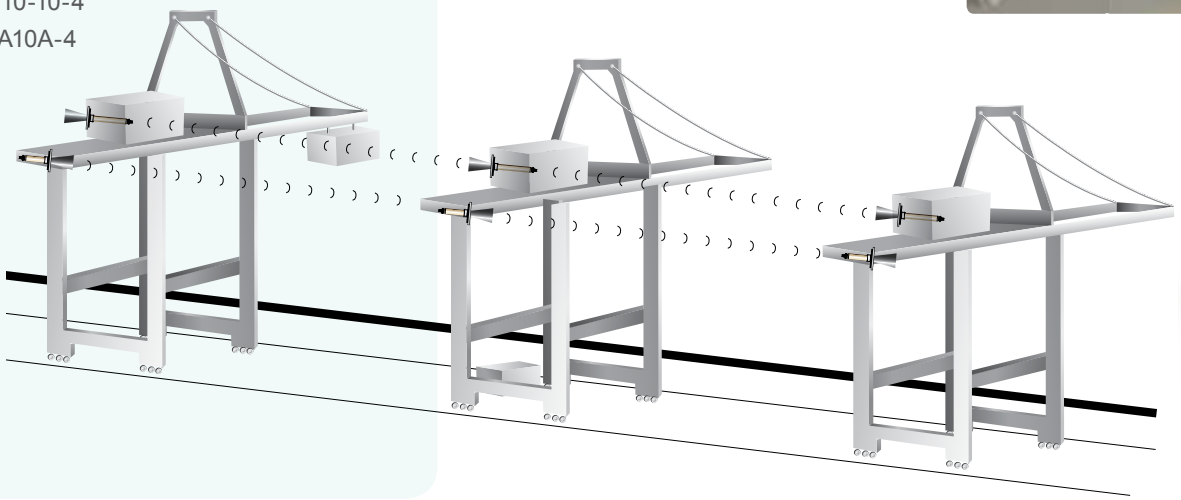
Primary Areas of Application

- Crane
- Heavy Machinery Anti-Collision
- Position Detection

Features

- Non contact measurement
- High Power per pulse
- Continuous 4-20mA measurement
- Up to 5 programmable relay alarms
- Wide range of communications: DeviceNet, GosHawk, HART, Modbus, Profibus DP, Foundation Fieldbus & Profibus PA
- Auto compensation for dust, steam and losses
- Protection class IP67, NEMA 4x (IP68 Transducer)
- Programmable fail safe mode
- 3G remote setup options / config
- Universal Supply: 4 Wire AC / DC
- Certifications: ATEX, IECEx, CE, CSA

Acoustic Cleaning



Sultan Machinery Positioning System

Description

The Sultan Machinery Positioning System is a non contact, two piece Master and Slave distancing transmitter for ranges up to 195 metres.

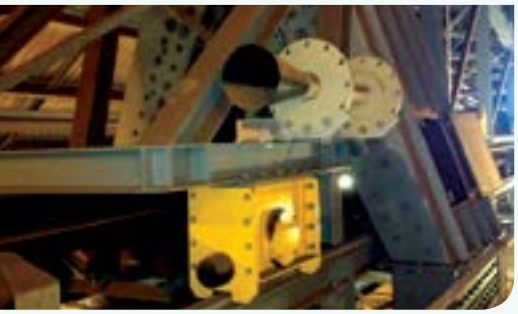
Typical System

Master

- AWR234SUXXXX
- AWRT04S4XXXC6XX
- C10-04-4
- FA10A-4

Slave

- AWR234SUXXXPS
- AWRT04S4XXXC6XPS
- C10-04-4
- FA10A-4



Principle of Operation

The Sultan Positioning System is generally mounted on moving machinery. It emits a high powered acoustic wave transmit pulse between two points.

The pulse is detected by a Slave transducer mounted on a fixed position which immediately emits a pulse back to the Master on the moving machinery.

The Master transmitter calculates transit times and provides a 4-20mA output proportional to the position of the moving machinery in relation to the Slaves fixed position.

There is NO wiring requirement between the Master and Slave transducers, which allows for easy retrofit to existing shuttle conveyors, cranes, stackers, reclaimers, etc.

Dust, background noise, wet atmosphere, high winds can be compensated for by proper selection of operating frequency of the transducer e.g. use lower frequency transducers where high dust, high wind conditions prevail.

Primary Areas of Application

Mining:

- Shuttle conveyor positioning
- Stacker / reclaimer positioning
- Stacker / reclaimer collision protection
- Transfer conveyor positioning

Power Stations:

- Shuttle conveyor positioning
- Transfer conveyor positioning
- Bunker discharge wagon positioning

Smelters:

- Crane collision control - positioning

Container Ports / Port Cranes:

- Crane collision control - positioning

Features

- Non contact position control
- Low installation costs, low purchase price
- Ranges to 195m (640ft) with 4 kHz version
- Does not rely on any mechanical connection that may slip because of the material on the rails (Encoder problems)
- Communications: HART, GosHawk, Modbus, Profibus and Fieldbus
- On power-up, instantly knows its position
- No interconnecting cable required between the Master and Slave transducers
- No wearing parts, no maintenance costs.
- Easy alignment adjustment (not critical like laser instruments)
- Easy to retrofit existing machines
- Not affected by reflecting surfaces e.g. roof struts, brackets, guard rails, trailing cables
- Either Master or Slave can be mounted on moving machinery.

Acoustic Cleaning

Sultan Flow Measurement System

Description

Real time flow measurement of liquid materials. The Flow Measurement System is capable of monitoring liquid flow under the most difficult conditions.

It suits a broad range of flumes, weirs and flow control structures.

Points of Difference

Why Use Sultan Flow?

Advantages

- Large selection of transducers
- No contact between the transducer and the material
- Easy to calibrate and commission
- Wide spectrum of flow applications
- Open channel flow
- Differential Level
- Average of 2 inputs
- Transducer cross talk prevention.

Principle of Operation

The Sultan Flow measurement system operates by transmitting an ultrasonic signal from its transducer towards the liquid being monitored. The reflected signal or echo is received by the transducer and processed. The time between transmission of the ultrasonic signal and reception of the echo is measured, and using the speed of sound through air, the distance from the transducer to the liquid level is calculated. Flow through the channel or structure is then calculated from the level measurement and the user entered properties of the channel.

The Sultan Flow system uses sophisticated software to locate and track the correct echo without being affected by echos from fixed objects or changes in the liquid surface. When the liquid level or surface conditions change, the system follows preselected signal tracking parameters. In the event of a total loss of signal, the system adopts signal recovery routines to relocate the correct liquid level.

The system employs automatic gain control to compensate for changes in echo amplitude due to variations in environmental conditions. Continuous current, voltage and relay outputs are provided. These outputs can be programmed for failsafe conditions in the event of a loss of signal or system malfunction.

Primary Areas of Application

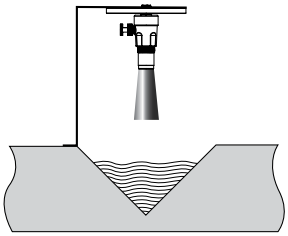
- Open Channel Flow
- Water treatment
- Sewage treatment
- Irrigation
- Industrial waste water
- Power waste water
- Environmental monitoring
- Special flow requirements for unusual flow channels.

Features

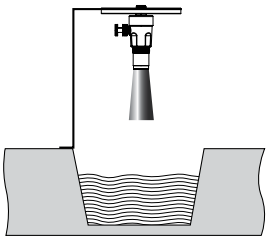
- Optimized frequency selections to suit the application environment
- Capable of monitoring liquid flow under the most difficult conditions
- Real time diagnostic display
- Flexible, multi point or calculated scaling of display and outputs
- Suits a broad range of flumes, weirs and flow control structures
- Programmable totalizer
- Programmable pulse per flow output
- Programmable failsafe mode
- Fast acting temperature compensation
- 3G remote setup options and configuration
- Wide range of communications: DeviceNet, GosHawk, HART, Modbus, Profibus, Fieldbus & Profibus PA.

Typical Applications

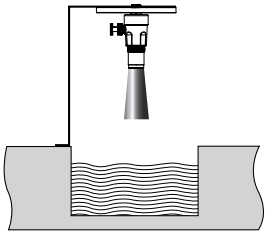
V-Notch
Sharp-Crested Weir



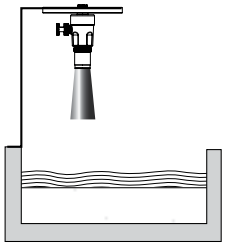
Trapezoidal
Sharp-Crested Weir



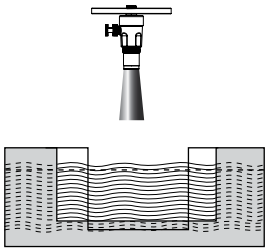
Rectangular
Sharp-Crested Weir



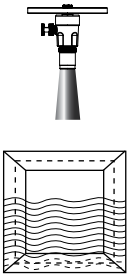
Rectangular Constricted
Sharp-Crested Weir

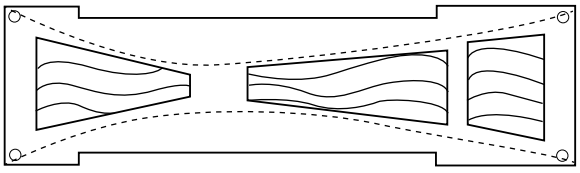


Parshall Flumes

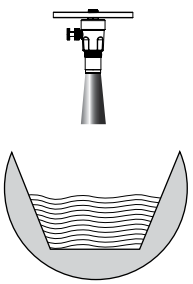


Khafagi-Venturi Flumes





Palmer-Bowlus Flumes



Application Reference - Sultan Flow Measurement

Reliable Technology for Open Channel Flow Measurement.

Application Problem

Open channel flow applications require accurate measurement of the surface level of a liquid. A flume, channel or structure which has a known characteristic flow per measured head, together with the measured liquid level, accurately define the flow rate through the system.

Traditional systems use a stilling well and pressure level measurement system to measure the liquid level in the structure.

Sedimentation and buildup will over time cover the sensing part of a pressure measurement system, leading to inaccurate or completely failed measurement. Buildup can also block passages to a stilling well, making any level measurement inaccurate or false. Regular cleaning of measurement systems and stilling wells is required to ensure operation.

Solution

HAWK uses a non-contact Acoustic Wave sensor, positioned directly over the channel or flow structure, or above the stilling well if required, to provide maintenance free, reliable measurement of the liquid level.

The HAWK Sultan Flow instrument calculates flow through a range of standard measurement structures, and can also be individually tailored to a non-standard flow characteristic. Measurements are temperature compensated, and sensors are available covering a broad range of water, waste-water, irrigation and environmental monitoring applications. Powerful measurement pulses keep sensor facings clean of moisture and condensation, ensuring maximum performance in all conditions.

Continuous and switched outputs are included, as well as local totalizing of flow, and the ability to provide pulsing outputs per flow volume to external counting devices.

Ordering Information

Remote system Amplifier:

AWFR234SUXXXX

Transducer for water applications <2m:

AWRT30T6TB20XC6XF

Transducer for water applications 2-5m:

AWRT30T4XXXC6XF with C04-4 cone.

Transducer for waste water applications:

AWRT20T4XXXC6XF

With C04-4 cone.

HawkLink Advanced Remote Communication

Description

HAWK offers a wide range of communication possibilities. GosHawk, DeviceNet, HART, Modbus, Profibus DP, Foundation Fieldbus, Profibus PA etc.

Remote technical support and complete commissioning of equipment in applications via our GSM / CDMA module allows monitoring and adjustments of settings no matter what corner of the world.

Points of Difference

HAWK's HawkLink

The solution to remotely querying and customising HAWK units is the HawkLink. This is achieved by the HawkLink communicating through a 3G mobile network to a GosHawk session running anywhere in the world.

The most significant feature of the HawkLink is to create a data connection between the user and the HAWK unit using the 3G wireless communications protocol. HawkLink can perform Modbus communications to HAWK units on a 234 wire network or to individual 2 wire HAWK units.

Important diagnostic information is displayed on the HawkLink LCD including network signal strength, network status and connection status.

Why Use HawkLink?

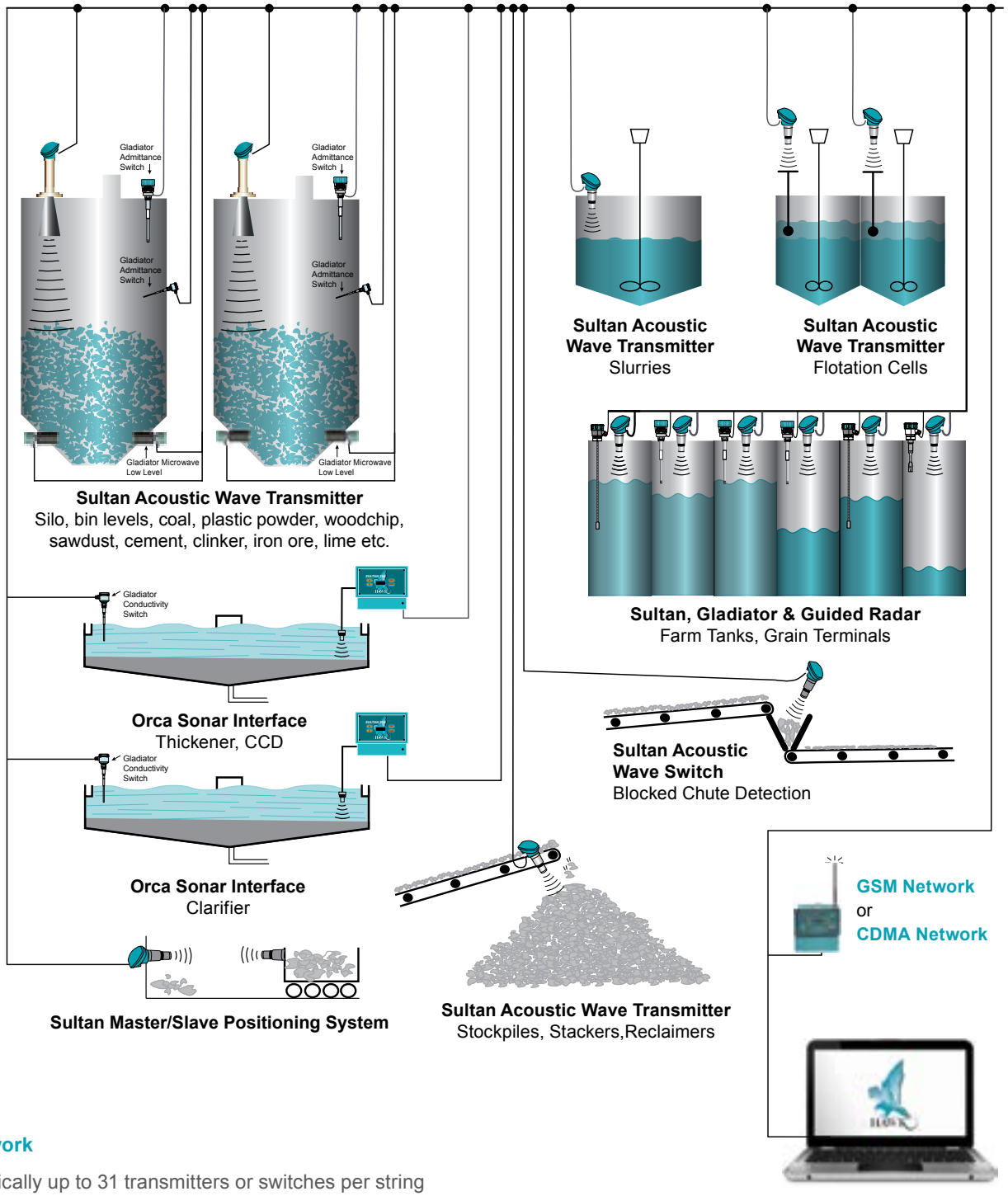
Advantages

- Typically up to 31 transmitters or switches per string
- Maximum 250 transmitters or switches
- Transmitters and switches can be monitored and calibrated remotely
- Alarm status and diagnostics can be monitored.

Features

- 3G cellular network
- Diagnostics of data communication and network status
- RS485 comms
- Accommodates 3 and 4 wire HAWK Modbus network
- Accommodates 2 wire HAWK unit(s) (5 maximum)
- Remote 2, 3 and 4 wire network reset option
- Remote control of HawkLink settings and operation.

Typical Configuration



Network

- Typically up to 31 transmitters or switches per string
- Maximum 250 transmitters or switches
- Transmitters and switches can be monitored and calibrated remotely
- Alarm status and diagnostics can be monitored.