



DREXELBROOK®

Level and Analytical Solutions Provider

Reliability • Service • Quality

www.drexelbrook.com

METEK®
SENSORS, TEST & CALIBRATION

Thank You For Considering AMETEK Drexelbrook

WE want to thank you for considering AMETEK Drexelbrook for your level measurement needs. We've earned our reputation as the world leader in level measurement technology by providing reliable and accurate level solutions to virtually every industry.

OUR reputation for excellence stems from our pioneering work in RF Admittance level instrumentation. We have discovered in our over fifty years of experience that there is no single technology that is appropriate for all application needs. Today, we provide solutions using nine different level measurement technologies.

WE promise to never over-represent the capabilities of our products or a particular technology. It is the goal of AMETEK Drexelbrook, and our worldwide network of representatives and distributors, to provide the most appropriate technology for your application needs.

WE pledge to provide you with a quality solution using the measurement technology that is best suited for the application.

Sincerely,

The Employees of AMETEK
Drexelbrook

Level Measurement

Level measurements can be classified into two major categories – point level measurement and continuous level measurement.

- **Point Level (ON/OFF)** measurement indicates the absence or presence of product at a certain threshold (point) within a vessel. Point level switches are used as high level and spill prevention alarms, low level and pump protection alarms, and to turn final control elements on and off
- **Continuous Level (Proportional)** measurement indicates the level in a vessel over the full span of measurement. These devices are typically used for process control, inventory control, and management

Technologies used to measure level are affected differently by the varying process conditions. No single technology is appropriate for all application needs. To satisfy these needs, Drexelbrook offers nine different level measurement technologies.

RF Admittance

RF Admittance is one of the most versatile technologies available providing both point and continuous level measurements. It operates on the principles of capacitance, but advances the technology by employing a patented Cote-Shield™ circuitry. This enables RF Admittance products to ignore the effect of process material coating on the sensing element. RF Admittance is unaffected by temperature, pressure, or density changes in the process material.

This technology works well on a wide range of liquids, slurries and solids applications for industrial and municipal markets. It has demonstrated proven reliability on some of the most severe services and difficult applications. With the proper sensing element it is ideal technology for corrosive, agitated, high pressure/temperature, and cryogenic environments. It is a technology that allows you to measure applications where foam and vapors are present and is an excellent choice for interface measurements. RF Admittance products will provide many years of maintenance free, exceptional performance.

Ultrasonic

Ultrasonic is applicable to both continuous and point level measurement. In continuous level measurements the transmitter sends an ultrasonic pulse to the surface of the material. The length of time it takes for the signal to return to the transducer is proportional to distance. For point level measurement, ultrasonic gap switches have one crystal that generates sound waves, which travel across an air gap to a second crystal. As material fills the gap, sound has a better medium to travel, causing the second crystal to resonate.

Ultrasonic technology typically requires no calibration for point and continuous level measurements. It is capable of providing a high accuracy, cost effective solution for liquid level and open channel flow measurements. Continuous ultrasonic devices are most reliable, and accurate, when used on liquid applications where foam, dust, and vapors are not present. For point level measurements, ultrasonic is best suited to clean, non-coating, liquids.

Radar

Radar is a non-contacting, continuous level technology. There are two types of radar transmission methods: Pulsed Time of Flight (PTOF) and Frequency Modulated Continuous Wave (FMCW). PTOF transmits periodic electromagnetic pulses and, like ultrasonic, measures the transit time. FMCW, the method used by AMETEK Drexelbrook, continuously transmits an electromagnetic wave to the surface of the process material and compares the transmitted frequency versus the received frequency. The electromagnetic wave is constantly in contact with the process surface which results in more power applied to the process material as compared to pulsed transmitters. For both transmission types, a higher signal frequency improves the ability to measure lower dielectric constant (reflectivity) materials.

Radar technology is suitable for measurement of liquids and solids, but does not measure interface. Radar does not require calibration and is unaffected by vapor, steam, and most condensation conditions. Radar is an excellent technology consideration for measurement ranges over 100 feet or where ultrasonic systems have been problematic. High accuracies are obtainable with this technology.

TDR

TDR (Time Domain Reflectometry) is also known by many other trade names such as “guided wave radar”, “radar on a rope”, or “reflex radar”. TDR works on the same principle as radar, except the signal is guided by a metal rod or flexible cable, not through open air. The TDR transmits a guided electromagnetic wave that travels at the speed of light to the surface material and is then reflected back to the electronic unit. The measurement is a time of flight calculation determined by the transit time divided in half.

TDR has no calibration requirement and is well suited to liquid, interface, and solid/granular measurements. It is not affected by variations in process material and/or moisture content. A key advantage of this technology is that the wave travels along a rod or cable, eliminating signal propagation losses. Users should be reminded that significant coating deposits on the guide cable (or rod) may be a concern and could affect the measurement. TDR has solved a number of continuous level applications where variations in the head space cause problems with non-contact technologies.

Magnetostrictive

Magnetostrictive technology is based on a float with embedded magnets that rides on a rigid or flexible tube containing a magnetostrictive wire. The wire is pulsed with a low voltage, high current electronic signal. When the signal intersects the magnetic field generated by the float, a torsional pulse is reflected back to the electronics. This results in a time of flight calculation that provides a highly accurate measurement which often exceeds the accuracy of radar.

This technology can provide level, interface, and temperature measurements. It does not require calibration or maintenance when applied to non-coating liquid applications. The material's viscosity, process compatibility, temperature, pressure and stability of specific gravity are all concerns when selecting this technology. Measurement ranges up to 50 feet are possible. Magnetostrictive provides exceptional accuracy and is easy to understand and troubleshoot.

Vibration / Tuning Forks

Vibration switches are used for point level measurements only. A tuning fork uses piezoelectric crystals that vibrate the fork at a specific frequency. When the fork is covered by product, the electronics detects the frequency variation, which then changes the output state of the switch.

Tuning forks have proven most reliable and accurate when used in liquid applications, although some manufacturers recommend them for solids. In solids, the vibrating fork can tunnel out (or “Rat Hole”) an air space causing a false normal condition. Also, solid materials often damage the tuning forks. For these reasons, we do not recommend the tuning fork for solids applications. In liquids, tuning forks provide a reliable and repeatable measurement for high or low level indication, as well as, empty pipe indication. This technology is unaffected by changes in electrical properties of the material and requires no calibration. This makes it the ideal solution for non-dedicated vessels.

Hydrostatic Pressure

Hydrostatic Pressure technology is one of the oldest forms of level measurement. The measurement principle is based on a submersible transmitter generating an analog signal proportional to the total head pressure above the sensing diaphragm.

This technology is used primarily for the measurement of water. The submersible transmitter is encapsulated in a 316SS housing and connected via a waterproof, flexible cable. Factors affecting the performance of this technology are buildup and/or fouling of the diaphragm, and contaminants that cause stainless steel compatibility issues. Hydrostatic technology can measure hundreds of feet of water head pressure. Due to the simplistic nature of most water applications, this technology can be easily applied and offers a high degree of reliability.

Conductivity

Conductivity devices are used solely for point level measurement. They consist of an electrode and ground that causes a relay transfer when a conductive liquid passes between them completing the circuit. Applications using this technology must be conductive since conductivity switches rely on the material being measured to carry current.

Typically, conductivity switches are used to measure high and/or low level in liquids such as water, acids, and other conductive chemicals. Conductivity switches should not be used in coating materials. The conductivity electrodes are connected to a relay to provide control and require little or no calibration.

Float Switches

Floats are one of the oldest methods of level measurement. This technology uses a low density float which rises on a higher density liquid, flipping a magnetically coupled limit switch.

Because floats are a mechanical switch, it is important to apply them to applications where coating buildup will not occur. Floats are much more prone to long-term performance issues due to coatings and wear. This easy-to-understand technology is suitable for clean, non-coating liquid levels.



Five Point Level Technology Solutions

One – RF ADMITTANCE

IntelliPoint RF™

Our versatile point level switch for liquids, slurries, granulars, and interface applications. With the IntelliPoint, simply install the sensor in your vessel and connect the power. The IntelliPoint, with an Auto-Ranging power supply, automatically calibrates itself. The self-test function of the IntelliPoint insures proper system operation. An AutoVerify™ self check circuit continuously monitors the complete system to verify it is functioning properly. The manual Certify™ not only checks the function of the system, but also checks the AutoVerify self-test circuits to make sure that they are also working properly. All these features make the IntelliPoint the most versatile RF switch on the market.



ThePoint™

An excellent product for most of your point level application needs. ThePoint offers many of the features and benefits of the IntelliPoint, at a more economical price. Maintenance free and no moving parts make this the ideal choice to replace high maintenance, less robust point level products. ThePoint is the best value for a no calibration point level switch in the industry.



Z-Tron IV™

Economical, general-purpose level switch for many liquids, slurries, and granular applications. The Z-Tron IV point level switch meets many of your point level measurement needs. Designed by the leader in RF technology for over 5 decades, the Z-Tron IV provides reliable point level operation at an economical price.



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Two – VIBRATION

TF-100™ Series

The TF-100 Series vibration technology level switch is an excellent choice for most high or low-level liquid level measurement requirements. The TF-100 requires no calibration and is not affected by changes in electrical properties of the material being measured.



Three – ULTRASONIC

VeriGAP™

Ultrasonic gap switch for liquids. Drexelbrook's VeriGAP ultrasonic gap switch provides reliable high or low-level measurement in a wide variety of liquids. The VeriGAP requires no calibration and is not affected by changes in electrical properties of the material being measured.



Four – FLOAT SWITCH

Float Switch

Reliable mechanical switch for use in clean liquids; a general-purpose point level device at an economical price. Simple installation and reliable operation make float switches a good choice for many point level applications.



Five – CONDUCTIVITY SWITCH

Conductivity Switch

Economical level switch for liquids and light slurries. A simple device that utilizes the conductive properties common to aqueous liquids to provide point level measurement.

Point Level Applications

Plugged Chutes

These sensors mount flush to the chute wall and detect when the product plugs the chute. This is an excellent solution for aggregate, mining, pulp and paper, and coal handling solutions.

Spill Prevention

RF, vibration or ultrasonic VeriGAP™-High and High-High point level indication for spill/overflow protection. Drexelbrook point level products meet EPA, OSHA, NFPA, and API recommendations for spill prevention.

Interface

RF point level is the best technology for detecting the interface between two electrically dissimilar liquids such as oil and water.

Power Plant and Coal Preparation

Rugged RF point level switches are the best solution for measuring high and low level conditions of fly ash in electrostatic precipitators and bag houses. Plugged chute detectors and empty belt detectors keep the coal flowing and reduce downtime.

Fugitive Emissions and Hazardous Materials

The Perm-A-Seal™ RF sensor has a patented injection-molded sealing gland that cannot leak, even under the most severe temperature cycling. Seal-Tyte™ RF sensors feature a hermetically sealed flange facing designed to eliminate leak paths.

Pilot Plant/Miniature Sensing Elements

Miniature sensing elements are available for pilot plants and other space-limited applications.

Pump Protection/Low Level or Interface in Outlet Piping

Non-intrusive ring-type sensor mounts between two flanges, directly into a pipeline. This absence/presence device is also ideal for glass- or rubber-lined vessels where vessel penetration is difficult.

Food/Beverage, Pharmaceuticals

These sensors come with standard 316L stainless steel Tri-Clamp® fittings.

Floating Roof Applications

The flexible cable sensor suspends over the floating roof and indicates when the roof comes in contact with the weight.

Viscous Material

Cote-Shield™ technology eliminates false alarms due to coatings. RF point level switches can be used in applications with even the most viscous materials.

Low and High Temperature

Drexelbrook point level sensing elements are designed to meet a wide range of temperature from cryogenic to over 1500°F.

OEM Products

Drexelbrook has designed many custom point level products for OEM clients.



Point Level Measurement Solutions

✓ = YES

✗ = NO

☎ = Consult Factory



		IntelliPoint RF™	ThePoint™	Z-Tron IV™	VeriGAP™	TF-100™
MATERIAL	Liquid	✓	✓	✓	✓	✓
	Granular	✓	✓	✓	✗	✗
	Slurry	✓	✓	✓	☎	☎
	Interface	✓	✓	✓	✗	✗
BUILDUP	None	✓	✓	✓	✓	✓
	Some	✓	✓	✓	✗	✗
	Heavy	✓	✓	✗	✗	✗
POWER SUPPLY	Auto-Ranging	✓	✓	✓	✗	✓
	Line Power	✓	✓	✓	✓	✓
	2-Wire	✓	✓	✗	✗	✓
TEMPERATURE	Low	✓	✓	✓	✓	✓
	Medium	✓	✓	✓	✗	✗
	High	✓	✓	✓	✗	✗
PRESSURE	Vacuum	✓	✓	✓	✓	✓
	Medium	✓	✓	✓	✓	✓
	High	✓	✓	✗	✓	✓
OUTPUT	Relay	✓	✓	✓	✓	✓
	8mA / 16mA	✓	✓	✗	✗	✓
	PNP / NPN	✗	✗	✗	✗	✓
	3A / Sanitary	✗	✗	✗	✓	✓
	Corrosives	✓	✓	☎	✓	☎
	No Calibration	✓	✓	✗	✓	✓
	Auto Verify™ Certify™	✓	✗	✗	✓	✗
	Remote Mounting Available	✓	✓	✓	✓	✗

Point Level Measurement Solutions

✓ = YES
✗ = NO
Ⓢ = Consult Factory



		Clearline	MultiPoint II	Conductivity Switch	Float Switch	Plugged Chute Detector
MATERIAL	Liquid	✓	✓	✓	✓	✗
	Granular	✗	✗	✗	✗	✓
	Slurry	✓	✓	✗	✗	✗
	Interface	✓	Ⓢ	Ⓢ	✗	✗
BUILDUP	None	✓	✓	✓	✓	✓
	Some	✓	✓	✗	✗	✓
	Heavy	✓	Ⓢ	✗	✗	✓
POWER SUPPLY	Auto-Ranging	✓	✗	✗	✗	✓
	Line Power	✓	✓	✓	✓	✓
	2-Wire	✓	✗	✗	✗	✓
TEMPERATURE	Low	✓	✓	✓	✓	✓
	Medium	✗	✗	✓	✗	✓
	High	✗	✗	✗	✗	✓
PRESSURE	Vacuum	Ⓢ	✓	✓	✓	✗
	Medium	✓	✓	✓	✓	✓
	High	✗	✓	✓	✗	✓
OUTPUT	Relay	✓	✓	✓	✓	✓
	8mA / 16mA	✓	✗	✗	✗	✓
	PNP / NPN	✗	✗	✗	✗	✗
	3A / Sanitary	✗	✗	✗	✗	✗
	Corrosives	Ⓢ	✓	Ⓢ	✗	✗
	No Calibration	✗	✗	✓	✓	✓
	Auto Verify™ Certify™	✗	✗	✗	✗	✗
	Remote Mounting Available	✓	✓	✓	✓	✓

Six Continuous Level Technology Solutions

One – RF ADMITTANCE

Universal IV RF Admittance Systems

Drexelbrook's years of application know-how with RF Admittance technology has enabled us to compile the most extensive database of application information in the level measurement industry. RF Admittance technology provides the basis for improved level measurement in the most difficult process environments.

Two – ULTRASONIC

USonic™ and USonic™-R

Integral or Remote Mounting Option

Our family of Ultrasonic technology products offers a 2-wire and line powered version for non-contact level measurement of liquids and slurries for level, distance, volume and open channel flow. Patented SmartGain™ circuitry automatically ignores false echoes from internal tank obstructions and agitator blades without adjustment. Products have superior accuracy – 0.15% of measuring range up to 30 feet. These products offer choices of display options – level, distance, volume, flow rate, temperature, signal strength, milliamp, and 2 totalizers. The USonic is available with 2-wire HART protocol, intrinsically safe or explosion proof, suitable for Class 1, Division 1, hazardous locations. The USonic-R line powered design offers 6 programmable relays, 2 channel input for differential level, batch sample activation, pump alternation, data logging, and totalization.

The Ultrasonic family of products is also pipe software capable. This allows the measurement through the pipe.



Three – RADAR

DR5200 and DR7000 Systems

The new DR5200, an FMCW 10 GHz radar is a great addition to the existing DR7000 (26 GHz) radar system. Both offer state of art design and performance. Both are able to operate over a 2 GHz bandwidth: this ensures sharper resolution and higher accuracy. The higher signal dynamics of these products allow the accurate detection of even the smallest level changes. Both models are 2-wire device with easy navigation display and touch screen interface, which allows for simple configuration and set-up. State of the art signal processing and a large bandwidth allow both the DR5200 and DR7000 to determine the true level in the tank, even with agitated surfaces.



Four – TDR

Impulse™, DR2000 and DR7100 Systems

The new family of TDR products that are 2-wire, loop powered with HART and advanced signal-processing, answers customers needs with proven solutions. Regardless of the application requirements, either the high performance DR7100, the DR2000, or the price competitive Impulse product lines will continue to measure where others fail.



Five – MAGNETOSTRICTIVE

DM330 and DM231

A recent technology development for highly accurate level measurement, the DM330 and DM231 use proven machine tool positioning accuracy combined with a process compatible float to offer a no maintenance, no calibration liquid level, and interface measurement system for the process industry. The DM231 is an explosion proof sensor that uses multiple high-accuracy floats to measure total and interface level. A Modbus® RTU digital output, and optional analog converter, is used to transmit total level, interface level, and temperature. It meets FM, CSA, ATEX and CE approvals for CL 1, Div 1, Zone 1 Explosion Proof.

Total Tank Level System (TLS)

The TLS is our latest generation magnetostrictive level sensor. It was designed for maximum application flexibility and features either a Modbus, 4-20mA or dual 4-20mA output. Offered in both a rigid and flexible probe up to 50 ft. This product has true multi-variable functionality, with total level, interface level and temperature all in one product. It also meets worldwide hazardous approvals with FM, ATEX and IECEx for Class I, Div 1 areas.



Six – HYDROSTATIC PRESSURE

Level Mate III™

Level Mate III hydrostatic level gauge system is designed for water well level monitoring and control. Ease of installation combined with no calibration makes the Level Mate III the choice for low maintenance water well measurements.



Continuous Level Applications

Interface Measurements

RF Admittance has a long-standing reputation as a proven technology when making difficult interface measurements. Recent developments in TDR have also made this technology a viable solution for some interface applications. RF level is the time proven, best available technology for indication and control of process interface level. RF technology inherently provides the greatest accuracy and repeatability in interface measurements independent of density changes. Variations in the material make-up of upper and lower liquid phase will have no appreciable effect on system accuracy and recalibration will not be required.

Non-Metallic Vessels

Non-metallic vessels pose no technical problem for Ultrasonic, Magnetostrictive, Hydrostatic Pressure, Radar, and TDR technologies. Should RF technology prove to be the best selection for short span high accuracy needs or corrosive material concerns, RF sensors that incorporate an integral ground reference or a secondary ground element can be used with success.

Long Measurement Ranges

For long measurement ranges or headroom limitations, flexible sensors offer insertion lengths of up to several hundred feet for the Hydrostatic Pressure and RF Admittance technology products. The DR Series of 2-wire TDR technology allows measurement ranges of up to 115 feet in selected applications such as grain silos or liquid applications. Magnetostrictive technology allows accuracy of 0.1% of measurement span in flexible sensor designs up to a maximum range of 40 feet. Non-contact technologies such as the DR Series Radar can have measurement ranges of up to 262 feet, model and application dependent.

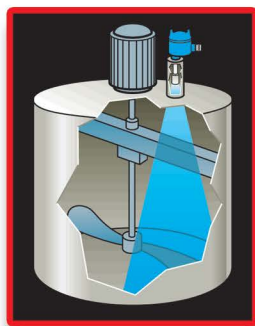
Short Span Measurements

RF Admittance technology provides one of the most preferred measurements in short span applications. As the level measurement span requirement decreases, the more appropriate RF technology becomes. In spans of only a few inches, RF systems can repeatedly produce accuracies of 1/32 inch. RF has the added benefit of not being limited by "Dead Zones" that are inherent with many other technologies that are typically selected for measurement ranges greater than 5 feet.

Specialized Sensors

Due to the flexibility of the RF Admittance technology, sensors for specialized service applications can easily be adapted for specific service solutions. A few of these designs have been made industry standards:

- > **Chlorine Measurement Sensors** - designs developed that meet the standards of the Chlorine Institute.
- > **Pilot Plant Miniature Sensors** - designs **that allow the full-**featured functionality of the RF technology combined with miniature sensors that will fit most smaller vessel requirements.
- > **Fugitive Emissions and Hazardous Material Sensors** - Seal-Tyte™ sensor designs feature a hermetically sealed flange facing that eliminates any potential leak paths within the sensor.
- > **High Temperature or Chemical Compatibility** - sensor designs for elevated temperature applications, or to meet chemical compatibility requirements, at affordable prices. New age sensor designs utilize modern chemically inert thermoplastics and ceramics that permit the use of high accuracy RF technology in many new and challenging application frontiers.



Continuous Level Measurement Solutions



✓ = YES

✗ = NO

☎ = Consult Factory

		RF Admittance		Ultrasonic	
		Universal IV Lite	Universal IV PRO	USonic™	USonic™-R
MATERIAL	Liquid	✓	✓	✓	✓
	Granular	✗	☎	✗	✗
	Slurry	☎	✓	✓	✓
	Interface	✓	✓	✗	✗
BUILDUP	None	✓	✓	✓	✓
	Some	☎	✓	✓	✓
	Heavy	✗	✓	✓	✓
POWER SUPPLY	Line Power	✗	✗	✗	✓
	2-Wire	✓	✓	✓	✗
TEMPERATURE	Low	✓	✓	✓	✓
	Medium	✓	✓	☎	☎
	High	✓	✓	✗	✗
PRESSURE	Vacuum	✓	✓	✗	✗
	Atmosphere to 50 psi	✓	✓	✓	✓
	High	☎	✓	✗	✗
PROTOCOLS	HART®	✓	✓	✓	✗
	Modbus® RTU	✗	✗	✗	✓
UNDEDICATED SERVICE	Homogenous	☎	✓	✓	✓
	Non-homogenous	☎	✓	✓	✓
	3A / Sanitary	✗	✓	✗	✗
	Corrosives	✓	✓	✓	✓
	Bench Calibration	✓	✓	✓	✓
	No Calibration	✗	✗	✓	✓

Continuous Level Measurement Solutions

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✗ = NO
☎ = Consult Factory



		Guided Wave Radar			Radar		Hydrostatic	Magnetostrictive
		Impulse	DR-2000	DR-7100	DR-7000	DR-5200	Level Mate III	TLS
MATERIAL	Liquid	✓	✓	✓	✓	✓	✓	✓
	Granular	✗	✓	✗	✓	✗	✗	✗
	Slurry	✓	✓	✓	✓	✓	✗	✗
	Interface	✓	✗	✓	✗	✗	✗	✓
BUILDUP	None	✓	✓	✓	✓	✓	✓	✓
	Some	✓	✓	✓	✓	✓	☎	☎
	Heavy	✗	✗	✗	✓	✗	✗	✗
POWER SUPPLY	Line Power	✗	✗	✗	✗	✗	✓	✓
	2-Wire	✓	✓	✓	✓	✓	✓	✓
TEMPERATURE	Low	✓	✓	✓	✓	✓	✓	✓
	Medium	✓	✓	✓	✓	✓	✓	✓
	High	✗	✗	✗	☎	✗	✗	✗
PRESSURE	Vacuum	✓	✓	✓	✓	✓	✗	✓
	Medium	✓	✓	✓	✓	✓	✗	✓
	High	✓	✓	✓	✓	✓	✗	☎
PROTOCOLS	HART®	✓	✓	✓	✓	✓	✗	✓
	Modbus® RTU	✓	✗	✗	✗	✗	✗	✓
UNDEDICATED SERVICE	Homogenous	✓	✓	✓	✓	✓	✓	✓
	Non-homogenous	✓	✓	✓	✓	✓	✗	✓
	Corrosives	✓	✓	✓	✓	✓	✗	☎
	Bench Calibration	✓	✓	✓	✓	✓	✓	✓
	No Calibration	✓	✓	✓	✓	✓	✓	✓

BS&W Water Cut Measurement

Universal IV™ CM Model

2-Wire, 4-20 mA, Water Cut Monitor

*Now with
Density Compensation!*



Applications

- Automatic Well Testing (AWT)
- Lease Automatic Custody Transfer (LACT)
- Basic Sediment and Water (BS&W)
- Separation Vessels
- Pipeline Slug Detection
- Truck Unloading
- Pump Protection
- Dielectric Analysis
- Machinery Lube Oil Monitoring

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Easy Configuration – Now with Built-in LCD Display and Keypad

All Universal IV CM's are factory pre-calibrated and require only one point validation. Field configuration can be done from anywhere along the two-wire loop with our HARTWin PC Software. You can also configure via local display / keypad without the need for laptop or handheld communicators.

Temperature Compensation

The dielectric constant of crude oil can change with any changes in temperature. These changes may cause standard cut monitors to change without any variance in water content. The Universal IV Water Cut Monitor measures product temperature internally and calculates a true water cut reading at any temperature within the process temperature range.

Density Compensation

The density or API gravity of crude oil changes due to many factors including temperature, material changes as well as the region and/or formation that it is being pulled from. These changes will cause standard cut monitors to mistakenly attribute changes in density to changes in water content if not properly accounted for. The new Drexelbrook Universal IV CM with Density Compensation utilizes system measured variables such as temperature, flow and density from a customer supplied Coriolis meter and calculates the corrected value for true water content.

Worldwide Approvals

The Universal IV CM Model has been approved for Class I, Div1, and Zone 0 hazardous locations. FM, FMC, ATEX, as well as IECEx approvals are available.

Durability

Our Perm-A-Seal sensing element does not require epoxy coatings that wear out and require expensive servicing. There are no gaskets that require servicing and the sensing element is robust in well fluids that include large amounts of sand.

Eliminate Routine Maintenance

The Universal IV CM is built upon the Drexelbrook expertise in RF Admittance that allows the electronics to ignore paraffin and other coatings that buildup on the probe. No need to take apart spool pieces and tie-off large pipelines. The Universal IV CM can be configured for NPT or flanged mountings and can be installed in common pipe diameters.

0-50% in Light Oil & 0-80% in Heavy Oil

The Universal IV CM comes factory pre-calibrated to one of 11 pre-set ranges, for Light Oil (API Gravity > 25) and Heavy Oil (API Gravity < 25).

Cote Shield™

The proven Cote-Shield is designed into the Universal IV CM series and enables the instrument to ignore a pre-determined length of the sensing element. The ability to ignore a pre-determined length allows the sensing element to extend into the fluid beyond the nozzle mounting, and possible pipe elbows, which can affect the measurement. The Cote-Shield™ puts the sensing area of the insertion probe directly into the process stream and guarantees a more representative sample of the emulsion.

Analytical Technology

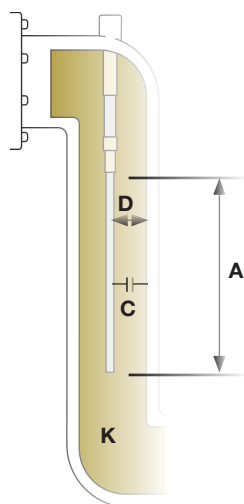
Operating Principle

The method of using RF Admittance to measure water cut is widely successful because of the large difference between the dielectric constants of oil ($k \sim 2.3$) and water ($k \sim 80$). The sensing element and the pipe wall form the necessary two surfaces of the concentric capacitor. The system electronics transmit a radio frequency voltage to the sensing element that measures changes in capacitance.

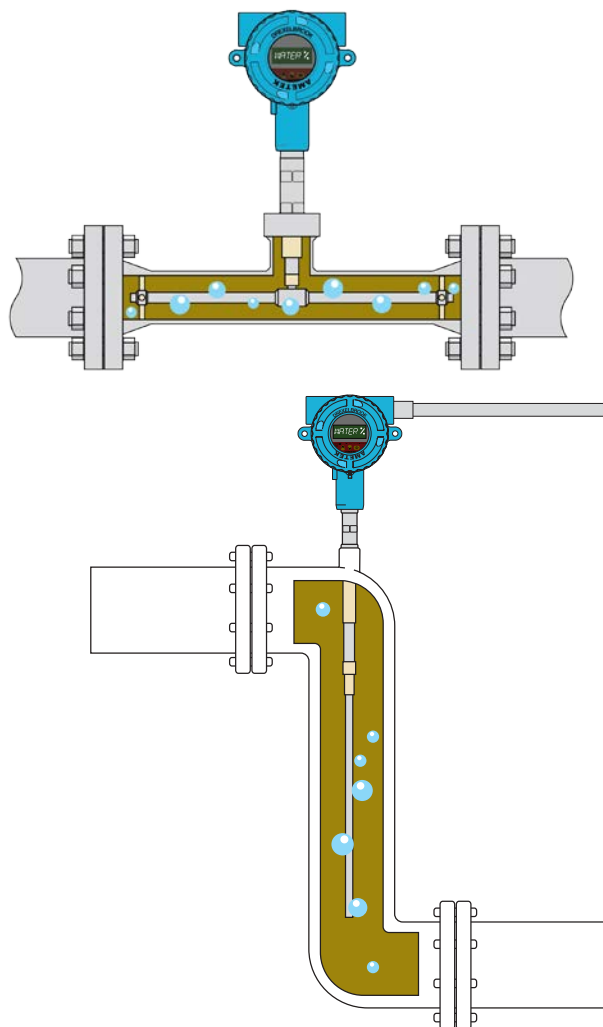
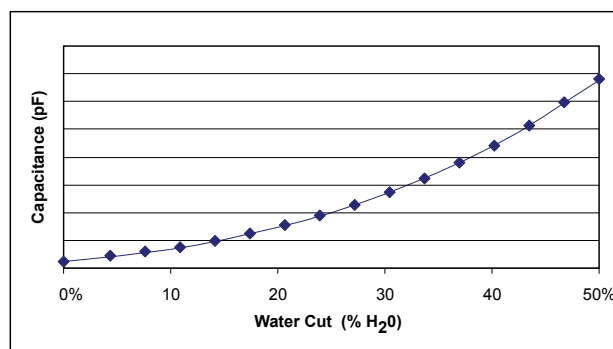
As the amount of water in the flowing oil increases, the net dielectric of the fluid increases which causes the capacitance to increase. The onboard electronics will compute the relationship between capacitance change and water cut. Straightforward, Reliable, Proven.

Typical Arrangement

$$\text{Capacitance} = \frac{\text{Dielectric (Area)}}{\text{Distance}} = \frac{KA}{D}$$



Capacitance Change with Water Content



Drexelbrook Sampling Advantage

The Drexelbrook insertion probe design enables it to analyze a large representative sample of the fluid that other manufacturers can not. The Universal IV CM utilizes a sensing element that is unique in its ability to be installed directly into the process without requiring spool pieces, side-arms or slipstreams. The sensing element shown will extend directly into the main process line for a minimum of 15 inches. The advantage of this is the capacitance of the fluid is taken over the entire length of the probe to create an averaging effect. The measurement is now taking a better sample of the fluid over a larger range to produce a smoother, more accurate, response.



Impulse Guided Wave Radar

The Impulse Guided Wave Radar employs field proven TDR (Time Domain Reflectometry) technology to provide accurate measurement of Total Level, Distance, or Volumetric outputs on all liquids and slurries. TDR Technology has been widely used for its inherent ability to remain unaffected by variations in the process materials electrical characteristics. AMETEK Drexelbrook has harnessed the technology with easy to use configuration menus in plain language. You will have the measurement you need, configured within minutes.

FEATURES

- 3mm accuracy and 1mm resolution
- <1 second response time
- No calibration or level changes needed for configuration
- Built-in push button interface or free HARTWin software for configuration
- Dual compartment housing design separates wiring terminals from IS circuits
- IS or Xproof/Flameproof approvals for Class 1, Div I and Zone 0
- 2-wire HART or Modbus communication interface

BENEFITS

- Superior and reliable level measurement performance
- Easy to install and commission
- Quick response to level changes
- Reliable performance in hazardous locations
- Compatible with a wide range of control systems

APPLICATIONS

- Wide range of applications: oil and gas production tanks, storage terminals, petrochemical, chemical tanks, water and wastewater tanks



Universal IV Pro and Lite

The Universal IV™ Series is the fourth generation RF continuous system built on Drexelbrook's 50 years of experience in level measurement. Our Pro model integrates the RF Admittance technology pioneered by Drexelbrook with the versatility of Cote-Shield™ technology that ignores coatings on the probe and measurement span of 1" to 800'. The Lite model is the entry level RF Capacitance measurement system without Cote-Shield™ capabilities.

FEATURES

- Measurement span as short as 1" (25mm) to 800 ft (244m) with no dead zone
- Immune to tank obstructions such as nozzles, ladders, pipes and agitators
- Built-in display/keypad or free HARTWin software configuration for initial setup
- Stable, repeatable, and accurate measurement within 0.25% of range
- Pro model available with proven Cote-Shield technology that ignores coating build-up on the probe
- FM, FMc, ATEX, IECEx, and CE approvals

BENEFITS

- The most versatile level technology for liquids, slurries, interface and granules measurement.
- Low cost of ownership, no maintenance, and no moving parts to wear out
- Fully backward compatible with Drexelbrook's leading products such as Universal III, Universal Lite, and RCT series
- Over 125 probe types for a wide array of applications, flex, rigid, wetted materials and process connections
- Built-in isolation and surge protection for increased reliability

APPLICATIONS

- Wide range of applications:
- Oil and gas measurement, desalters, molten sulfur
- Water and wastewater, digesters, water tanks
- Food and beverage
- Petrochemical
- Pulp and paper



USonic

The USonic makes measurements on level, distance, volume, or open channel. This affordable, 2-wire transmitter uses SMARTGain technology that automatically ignores most internal obstructions with no user adjustments required.

FEATURES

- 30 ft range (9.1 meters)
- Accuracy: $\pm 0.15\%$ or 0.2 inch of sensor range, whichever is greater
- 300 millisecond response time
- SMARTGain™ eliminates interfering signals from agitators and other internal vessel obstructions
- Unique pipe software for stilling well applications
- PC or HART communicator configuration
- Compact transducer design allows mounting in any 2-inch nozzle
- IS/Xproof approvals for Class 1, Div 1, Zone 0 environments
- One size fits all applications

BENEFITS

- Affordable 2-wire system with the performance and benefits of premium, line powered systems
- Easy set-up and configuration
- Reliable performance in a wide range of applications
- Display is menu driven and can easily be configured without detailed procedures
- Bench configuration eliminates the need to move process material levels for calibration

APPLICATIONS

- Mud tanks
- Logging
- Frac fluids
- Water tanks



Universal IV Water Cut Monitor

For over 50 years, Drexelbrook has established itself as the world's leader in capacitive based water cut measurements. We have done this by providing reliable and accurate products at a reasonable cost. We offer the highest pressure and temperature ratings in the industry. Our probes can handle pressures up to 1500 PSI and temperatures up to 450°F.

FEATURES

- 0.03% water content accuracy
- Temperature compensation
- Density compensation
- Robust probe design
- Pipe insertion design
- Spool probe options (2", 3", and 4" sizes)
- 2-wire HART communication interface
- Built-in display/keypad and free HARTWIN software
- 11 water cut ranges built-in one unit
- IS and Xproof/Flameproof approvals
- FM, FMc, ATEX, IECEx

BENEFITS

- Reliable and consistent BS&W measurement
- Low cost of ownership
- Easy installation and serviceability
- Reliable performance in hazardous locations

APPLICATIONS

- LACT skids (Lease Automatic Custody Transfer)
- Crude oil metering skids
- Truck unloading
- Automatic Well Testing (AWT)
- Separation vessels
- Lube oil reservoirs

Our Values and Commitment...

We Thank You For Considering Drexelbrook

We are confident that we can exceed your level measurement expectations and provide you with the best level measurement solutions.

We are committed to providing you with:

- > Best level expertise in the industry
- > Best value in level instrumentation
- > Best in customer support
- > Widest breadth of technologies
- > Highest possible product quality
- > Best in class products

For additional information on products or to find a local representative in your area, visit us at www.drexelbrook.com

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Reliability • Service • Quality

AMETEK®

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