



The SMARTsensing Product Catalog

Elevating People with Technology.



KCF at a Glance

Transforming Industry. Together.

Our Mission: Our team is on a mission to transform industry by solving critical machine health problems through the convergence of Industry 4.0 technology and people. We develop smart, gritty solutions to tackle your toughest challenges. We envision a world with Zero Injuries, Zero Waste, and Zero Unplanned downtime by 2030.

What We Do:

Our platform consists of 3 components—Hardware, Software, Services.



HARDWARE: Your machine health optimization program can only be as good as the data it's built from. KCF provides ruggedized hardware solutions, designed to monitor everything from the most basic rotating equipment, to complex intermittent assets.



SOFTWARE: SMARTdiagnostics® software displays real-time machine health insights in a format anyone can understand, enabling teams to take faster action and keep critical machinery up and running with less downtime and less safety risk.

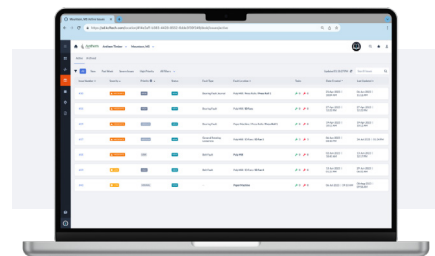


SERVICES: Our SENTRYsolutions™ team of problem solvers is here to partner with you through every step of your machine health journey. With our services, you'll get a team of Mobius Certified engineers that act as an extension of your team to offer industry leading solutions.

“The modern plant may produce more data than tangible goods, and yet most of it gets left on the shop floor. We developed the SMARTdiagnostics® platform to turn overwhelming amounts of manufacturing data into actionable machine health insight.”

DR. JEREMY FRANK

CEO and Co-Founder
KCF Technologies



\$4B+
in Customer Savings

The Value:

KCF works in conjunction with our customers to eliminate waste, downtime, and injuries by engaging today's workforce through technology. In order to quantify and measure this impact over time, we work to convert everything from complex optimization projects to simple downtime avoidance into 'dollars saved.' This metric drives our collective teams to remember the work we're doing is having a real impact in the communities we serve. Those dollars can be reinvested into the business and the workers so they can continue to thrive.

LOU ROMANO
President
KCF Technologies

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The SMARTsensing Product Suite

Our Core Product Family: The High-Definition Vibration Sensor, The Base Station Gateway, Piezo Sensing, and The IoT HUB





Hardware at-a-Glance:

High-Definition Vibration Sensor

Optimized for low power use, KCF's 3rd generation wireless High-Definition Vibration Sensor uses easily replaceable batteries and KCF Technologies' proprietary wireless protocol to transmit a full vibration spectrum over the air on a nearly-continuous basis.

The KCF Vibration Sensor Advantage:

- Class 1/Div. 2 Certified
- IP67 Rating
- Withstands -4° to 167°F
- Industrial Grade Hardware
- Impact Resistant Shell
- Actionable Data in 3 Minutes

Total Cost of Sustainment:

16x Less Than the Average Competitor

Key Features:

Reliable Monitoring

Vibration Sensor Nodes provide health monitoring in the most hard-to-reach, rugged locations. Each node communicates wirelessly with SMARTdiagnostics® Software.

Flexible Configuration

The system is highly configurable and scalable. A system can have thousands of sensor points, each of which can be configured to transmit data on a user-selected frequency with unique indicators.

Cost-Effective

Easily installed without the downtime, expense, and labor costs of hard-wired sensors. Simply place the sensors where they're needed and within minutes they transmit data.

Ruggedized Solutions, Designed to Provide the Right Data.

KCF's High-Definition Sensor offers industry leading data acquisition—collecting the full spectrum of data as often as once every minute. Our unique ability to take high-interval, full spectrum data, allows for a best-in-class machine learning training dataset—delivering exceptional predictive maintenance analytics.



Hydraulic Fracturing Site, CA

The sensor's powerful magnetic base makes install simple—no tools required. Where magnetic mounting won't work, there is a 3/4-28 stud mounting feature.

8x More Data Per Battery



Hardware at-a-Glance:

Base Station

The Base Station is the nerve center of any SMARTdiagnostics® Machine Health Platform installation, allowing effective predictive maintenance for your industrial equipment.

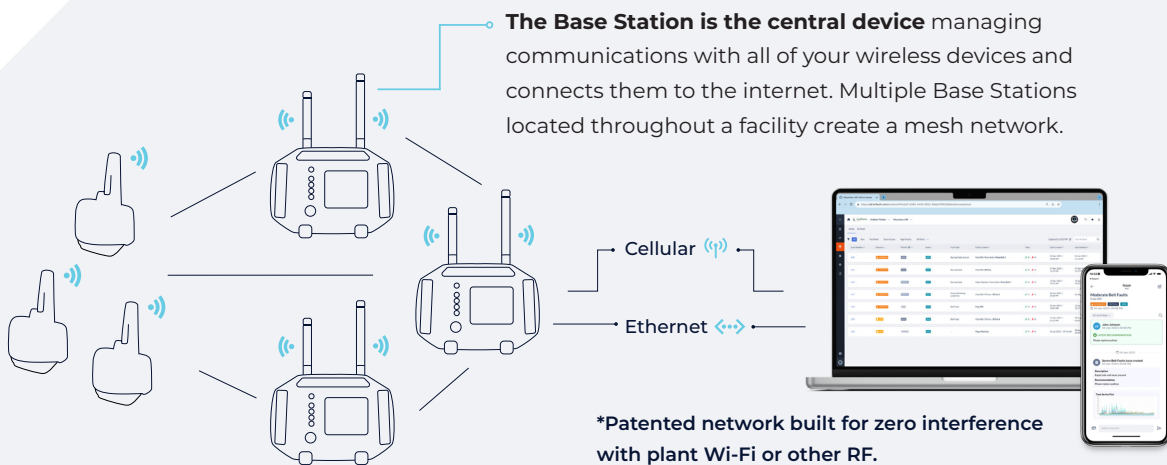
The KCF Hardware Advantage:

DART Wireless

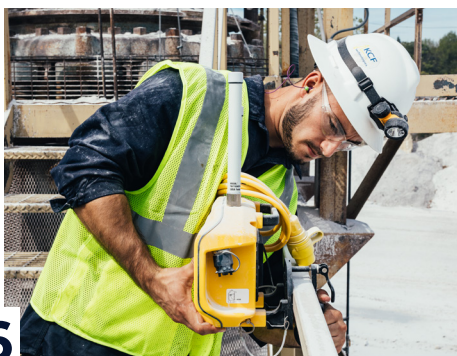
DART Wireless is KCF's communication protocol used for sending data through our mesh network of sensors and Base Stations. Sensors do not need to be paired to a specific Base Station. Instead, they can hop from one

Base Station to another—utilizing the strongest signal pathway, ensuring a reliable stream of continuous data without any user input. This makes the system a very modular and scalable solution for facilities of all sizes.

How It Works:



The Base Station is the central device managing communications with all of your wireless devices and connects them to the internet. Multiple Base Stations located throughout a facility create a mesh network.



Installation:

Our Base Stations Need Just Two Things for Use:

Base Stations only need a power outlet, and an internet connection. This connection can be through your plant's Ethernet, or the Base Station's built-in cellular modem.

Base Stations are mounted using KCF's universal mount.

This allows for mounting to poles, railings, walls, shelves, and more—usually without the use of tools. It's best to mount the Base Station up high, both to get a good line of sight above most of the shop floor equipment, but also to keep them out of reach.

Hardware at-a-Glance:

Piezo Sensing



Piezo Sensing, part of the SMARTsensing suite of hardware products, expands the already robust capabilities of the KCF Technologies Comprehensive Machine Health Platform.

Large, slow rotating equipment, such as paper machines, can often present challenges when monitoring using traditional methods. When equipment moves slower, advanced methods are needed to accurately track and prevent machine failures. Piezo Sensing solves this problem by using advanced enveloping technology – a processing method that isolates and highlights impacts, making accurate detection possible – Piezo Sensing enables you to monitor your most critical equipment, regardless of speed all within one platform.

Use Cases:

1. Slow Rotating Equipment
2. High Monitoring Point Density Locations
3. Integrating Legacy Sensors
4. Extreme Temperatures

Key Features:

Enhanced Bearing Fault Detection with Enveloping:

Without the right solution, picking up the minute, high frequency impacts arising from bearing wear can be difficult to detect. Piezo Sensing isolates and highlights high-frequency components for superior bearing fault detection.

By leveraging advanced high frequency enveloping, Piezo Sensing excels in isolating and accentuating even the most subtle impacts caused by bearing wear. This capability is crucial, as without the right technology, these minute yet critical symptoms can easily go unnoticed. Piezo Sensing's implementation of enveloping ensures that these signals are captured consistently and reliably. Providing unparalleled precision in bearing fault detection and ensuring the reliability and longevity of your equipment.

Ideal for Slow-Rotating Equipment:

With its exceptional high-speed sampling capabilities, Piezo Sensing records 96,000 samples per second, ensuring the precise detection of even the subtlest bearing faults. This, combined with its ability to support extended sampling durations, makes Piezo Sensing uniquely adept at monitoring equipment operating at ultra-low speeds, down to 2 RPM. Such comprehensive coverage ensures that even the earliest signs of potential issues are captured, facilitating timely intervention, and preventing minor faults from escalating into major failures.

Piezo Sensing is Part of the KCF SMARTsensing Suite

Powering Better Monitoring Capability for Your Critical Assets Than Ever Before.



Hardware At-A-Glance:

The IoT HUB

The SMARTdiagnostics® IoT HUB is the next generation of full asset health solutions designed to handle the most complex asset monitoring needs.



IoT HUB Features:

7 input channels per HUB system.

Battery power OR permanent wiring to a power source.

Take in several channels of vibration data from different key monitoring points on a large asset, along with a trigger input port to a particular moment in the machine's operating cycle. With analog adapters and IEPE sensors, the remaining ports can be used to collect data from other sensor types, such as pressure, current, or oil humidity.



Water Treatment Plant, PA

Key Applications:

High-Temperature

Power is supplied to the IoT HUB, so it can be positioned away from extreme environments. This allows sensors to be placed on high temperature machines without compromising battery power.

Triggered Machines

In triggered machines, such as robots, the IoT HUB can be configured to activate sensors in response to unique movement patterns. This allows for more focused data collection as opposed to more traditional continuous monitoring.

Shielded Machines

Assets in shielded areas, such as those covered by metal or screening, pose an issue where wireless sensors struggle to connect to the network. The IoT HUB provides a wired solution for monitoring these machines.

IoT HUB ctd.

Designed to Handle Your Most Complex Monitoring Needs.

Signal Propagation: To instrument a large asset we might have many vibration sensors that have weak wireless signal strength. With the HUB however, the sensor is decoupled from the wireless module, so you can put many sensors exactly where you want them, and then put the single HUB in a better place for wireless connectivity. This also opens the door for submerged applications.

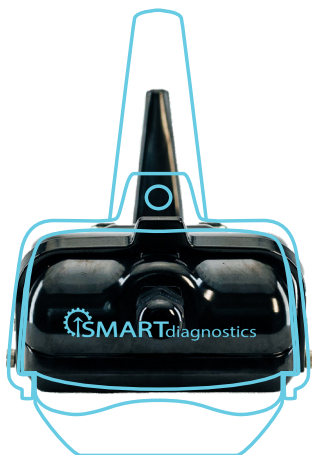
Mix of Sensor Types: Often the right monitoring solution for an asset is a mix of sensor types—vibration, temperature, pressure, current, etc. The IoT HUB makes managing multiple sensor types easy for you and your team.

Intermittent Operation: If the machine is intermittently operated, or has a complex cycle that changes, and we want to collect data at a particular moment in that cycle where damage may occur, using a HUB is critical. The HUB is continuously looking for this trigger signal, and once it sees it, it collects a measurement. That way, you're always collecting data at the same moment in the operating cycle.

Synchronous Data Collection: The IoT HUB features triggered data collection, and because it has multiple input ports, this means we can accurately time-synchronize samples from multiple monitoring points. With the HUB, we can take them all at the same time, or at delayed times of our choosing. This opens the door for things like phase analysis and orbital plots.

High-Temperature: The IoT HUB's vibration sensors are built to withstand hotter temperatures than vibration sensors, primarily because they do not have a battery onboard, so they aren't limited by a battery's temperature rating.

The HUB can be battery-powered or permanently powered by 24VDC or 110 VAC or 220VAC. The permanently-powered options can be enablers in applications where battery replacements are a hurdle.



Achieve 3.6x More Asset Coverage with the only comprehensive platform to ingest Oil, MCSA, Pressure, Vibration, Legacy IEPE sensors, and Ultrasound into one software platform.



The IoT HUB Monitors:

**adapters necessary for monitoring*

- Oil Humidity
- Current Signature
- PLC Trigger
- Tachometer
- Pressure Signature
- Ultrasonic Sensing
- Voltage
- Motor Current Signature Analysis (MCSA)

The Advanced Solutions Suite

Advanced Solutions: The Analog Adapter, The IEPE Adapter, Tachometers, Pressure Sensors, Ultrasonic Sensors, Oil Humidity Sensor, Motor Current Signature Analysis (MCSA)



An IoT HUB Accessory: Analog Adapter

Now your IoT HUB can monitor nearly any common process signal. The Analog Adapter can accept voltage/current signals, allowing you to trend and alert these values in real time, just like traditional vibration data.



Analog Adapter Applications:

**Requires AC-powered Hub or +24V external power through Hub Trigger/Power port.*

- Speed Monitoring
- Object Detection
- Oil Humidity Analysis
- Ultrasonic Monitoring
- Pressure Monitoring
- Temperature Monitoring
- Energy Consumption
- Motor Current Signature Analysis (MCSA)



Power	Provides power for most transducer types
Mode	Software selectable voltage or current input
Voltage Signals	0-10 V, -10 to +10 V, and 4-20 mA
Configurable Sampling Frequency	62 -8192 Hz
Memory	4096-sample
Converter	16-bit high-performance Analog-to-Digital
Temperature Sensor	Internal
Operating Temperature	-40 to 185°F (-40 to 85°C)
Case	Chemical-resistant polycarbonate alloy with stainless steel cable entries
Connector	Standard M12 4-Pin A-coded Male connector

Key Features:

The Analog Adapter requires an IoT HUB for use.

The SMARTdiagnostics IoT HUB is the next generation of full asset health solutions designed to handle the most complex asset monitoring needs. **Including:** triggered collections, multi-functional sensor ports, and the ability to withstand higher temperatures with external power sourcing, with optional wired power solution.

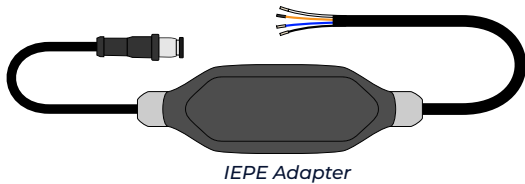


Automotive Plant, OH

An IoT HUB Accessory:

IEPE Adapter

Bring your existing or add new integrated electronics piezo-electric (IEPE) accelerometers or dynamic pressure sensors to SMARTdiagnostics. The IEPE Adapter enables data collection from these commonly used transducers that may already be installed on your equipment.



With the IEPE Adapter, collect 24/7 vibration data without changing infrastructure.

IEPE accelerometers are commonly used for route-based preventive maintenance and monitoring. The IEPE adapter can monitor a single axis accelerometer/transducer and provide up to 8 kHz measurement bandwidth for early onset detection of potential machine failures.

**Requires AC-powered Hub or +24V external power through Hub Trigger/Power port*



Key Features:

Power Source	Integrated 4 mA constant-current
Detection	Transducer short or open-circuit
Input	0-2.0V auxiliary analog
Configurable Sampling Frequency	125 Hz-16 kHz
Memory	4096-sample
Converter	16-bit high-performance Analog-to-Digital
Temperature Sensor	Internal
Operating Temperature	-40 to 185°F (-40 to 85°C)
Case	Chemical-resistant polycarbonate alloy with stainless steel cable entries
Connector	Pigtail leads to accommodate various customer installations offered, standard connectors (e.g. 2-Pin MIL-C-5015) available at time of order

Both IEPE Adapters and tachometers require an IoT HUB for use.

The SMARTdiagnostics IoT HUB is the next generation of full asset health solutions designed to handle the most complex asset monitoring needs. **Including:** triggered collections, multi-functional sensor ports, and the ability to withstand higher temperatures with external power sourcing, with optional wired power solution.

An IoT HUB Accessory:

Tachometer

Enhance your vibration monitoring capabilities for variable speed assets in your plant using two new tachometer sensor options—inductive and optical.

**Tachometers require a KCF Technologies IoT HUB and analog adapter for use.*

Key Features:

1. Bring tachometer data into the machine health platform.
2. Options for install: Inductive and Optical.
3. Identify optimal running speeds for machine health and throughput.

Variable speed assets, such as paper machines and conveyors, can be challenging to monitor due to constantly changing conditions. Trending running speed data in real-time with vibration data gives a clearer picture into the health of your assets. By using tachometers alongside vibration sensors, clear connections between running speed and vibration can be made, giving operators the power to know the optimal conditions for throughput and machine health and allowing structural resonances to be addressed.



KCF Offers Two Types of Tachometers:

- **Inductive:** Inductive is best suited for equipment that may be running in dirtier environments. In addition, it must be mounted very close to the shaft.
- **Optical:** Optical is best suited for machines that remain relatively clean. In addition, it is useful in places where mounting directly next to the shaft is not possible.



3.6x

More Asset Coverage

The IoT HUB Enables the Achievement of **3.6x More Asset Coverage** with the only comprehensive platform to ingest Oil, MCSA, Pressure, Vibration, Legacy IEPE sensors, and Ultrasound into one software platform.



Water Treatment Plant, PA

An IoT HUB Accessory:

Pressure Sensor



Pressure Sensing is one of the many capabilities seamlessly integrated into KCF's Comprehensive Machine Health Monitoring Platform.



Gain the ability to see real time pressure data, right alongside vibration and temperature data in one easy-to-use platform. This capability within the product family unlocks the ability to detect and proactively correct problems such as clogged filters, air/gas leaks, improper configuration, among others, all through a single vendor, eliminating costly time-based maintenance protocols.

KCF offers both Differential and Absolute pressure sensors, each with their own unique use cases.

To develop the best configuration for your application, work with your KCF representative.

Differential Pressure Sensors: Used to measure the difference in pressure between two points in a system at a very precise level. They are best suited for systems where measurements of small pressure differences are needed.

- Filter clogging
- Air/gas leaks
- Dampers/valves friction losses
- Fan/pump efficiency

Absolute Pressure Sensors: Measure the pressure at a single point in a system, and are available in a wide range of sensitivities for various systems. Issues that can be diagnosed using Absolute Pressure sensors include:

- Pump cavitation
- Pump efficiency
- Impeller
- Filter/screen clogging
- Compressed air/gas leaks
- Valves/heat exchangers friction losses



Pressure Sensors require a KCF Technologies IoT HUB and analog adapter for use.

The SMARTdiagnostics IoT HUB is the next generation of full asset health solutions designed to handle the most complex asset monitoring needs. **Including:** triggered collections, multi-functional sensor ports, and the ability to withstand higher temperatures with external power sourcing, with optional wired power solution.



Water Treatment Plant, PA

An IoT HUB Accessory: Ultrasonic Monitoring

UE Systems UltraTrak 850s joins the KCF Technologies family of products.



The World's Smartest Permanently Mounted Ultrasound Sensor has joined KCF's Comprehensive Machine Health Platform. Gain the power to see real time ultrasonic, temperature, and vibration data in one easy-to-use platform. This addition to the product family grants platform users the ability to detect problems in the applications vibration isn't quite sensitive enough to detect, to identify asset faults at the earliest stages—all through a single vendor.

APPLICATIONS:

Slow Speed Bearings; Steam Traps; Valve Leak Detection

Ultrasonic has the Ability to Monitor:

Stage 1 and 2 Bearing Faults on BOP Assets	✓
Bearing Faults on Slow Rotating Equipment	✓
Leak Detection	✓
Steam Trap Monitoring	✓

Traditional ultrasonic sensors require tedious manual adjustments for every application and still have gaps in asset coverage. The Ultratrak 850s is smart, with automatic sensitivity adjustment. And with a measurement range of 0-100db, the Ultratrak 850s can detect everything from the lightest change to the largest fault condition.



The UltraTrak 850s sensor requires a KCF Technologies IoT Hub and analog adapter for use.

An IoT HUB Accessory:

Oil Humidity Sensor



Oil humidity is one of the many monitoring capabilities seamlessly integrated into KCF's Comprehensive Machine Health Monitoring Platform.

Oil humidity is a measure of how much water is dissolved in a sample of oil.

Humidity in oil can cause lubrication loss and corrosion of machine parts, so continuous oil humidity monitoring is critical in diagnosing and preventing a potential failure.

Correlating rises and falls in humidity with the timing of process changes can help identify root causes of water ingress, which could occur not only from the breaching of an oil system by liquid water, but from humid air entering through a vent or a breather.

In addition to monitoring oil humidity, the IFM LDF-100 measures oil temperature, that could signal late-stage wear in gears.



Applications:

For more information on applications, work with your KCF representative.

- Lubrication or hydraulic systems in high-humidity environments, such as steam turbines.
- Correlating process changes with rises and falls in humidity
- Identifying potential system design failures causing water ingress



Oil Humidity Sensors require a KCF Technologies IoT HUB and analog adapter for use.

The SMARTdiagnostics IoT HUB is the next generation of full asset health solutions designed to handle the most complex asset monitoring needs. **Including:** triggered collections, multi-functional sensor ports, and the ability to withstand higher temperatures with external power sourcing, with optional wired power solution.



📍 Water Treatment Plant, PA

Motor Current ^(MCSA) Signature Analysis

Pairing MCSA technology with vibration monitoring results in a comprehensive asset health solution crafted for your most critical electric motors.



The addition of Motor Current Signature Analysis (MCSA) to KCF's comprehensive machine health platform combines MCSA's robust motor-electrical diagnostic capabilities with the high-fidelity continuous monitoring, ease of installation, and focus on root cause eradication that are central to KCF's solutions.

KCF offers a suite of products to achieve advanced condition monitoring using MCSA. These Include:

The IoT Hub: Transmits full-spectrum data to KCF's machine health platform, SMARTdiagnostics.

Analog Adapters: Connects each of the transformer types to the IoT Hub.

Current Transformers (CTs): Identifies motor faults.

Current Triggering: Enables synchronized sampling on motor startup, enabling the identification of hard to catch phenomena including inrush current.

***Tachometer:** Provides precise reading of motor (rotor) turning speed—important for MCSA Analytics Model.

***Potential Transformers (PTs):** Enables electrical current signature analysis (ESA). Identifies power supply issues and enables root cause analysis.

***Optional Hardware**

Additional Operating Data Uses Unlocked by MCSA in KCF's Machine Health Platform:

- Power Consumption
- Power Factor Duty Cycle (+ total operating hours)
- Motor Efficiency

Advantages of KCF's MCSA Solution:

24/7 Monitoring: Provides continuous online monitoring with 24/7 access to critical data. Effectively covering all blind spots that exist between readings in periodic route-based monitoring.

Triggering: Allows motor behavior during start up to be trended over time, enabling early detection of damaging conditions and motor issues.

Improved Safety: Route-based analysts or maintenance staff members no longer need to enter dangerous environments to take readings.

Root Cause Analysis: The inclusion of potential transformers facilitates power supply monitoring. This enables the identification of chronic power supply issues, eliminating the cause of motor faults and suboptimal performance.

When to Use MCSA:

Costs of Downtime Are High: When failure costs a significant sum due to lost production.

Failure Prevention is Essential: When motor replacement cost is significant, or failure results in collateral damage such as product needing to be discarded, or adjacent equipment being damaged.

Regulatory & Fines Risk Reduction: When catastrophic failure results in fines levied against the customer.



Ready to Take the Next Step in
Your Machine Health Journey?
Let's Get in Touch.

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