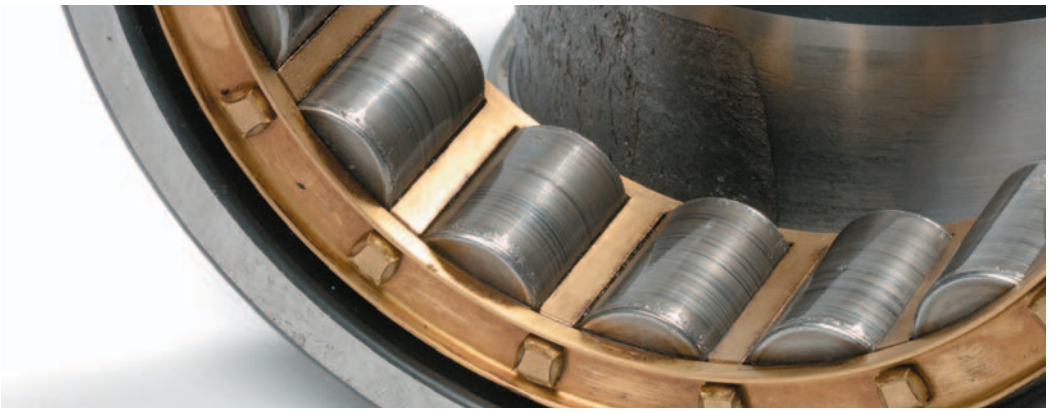
KITTIWAKE
monitoring innovation



Online Sensors

Remote Sensors - the online link between your machines and ultimate reliability

Online Sensors

Monitor machine wear
Cut costs
Extend oil life
Avoid critical failure

The requirement for on-line machinery and oil condition monitoring is becoming evermore apparent as maintenance costs increase and production capacity and equipment performance is maximised. Brought to you by a company that has been delivering low-cost, robust field instrumentation to the lubricants and fuels market for over fifteen years the range of instruments has been designed to accomplish the three primary objectives of oil analysis:

- Ensure lubricant condition.
- Control contamination.
- Detect and analyse wear debris.

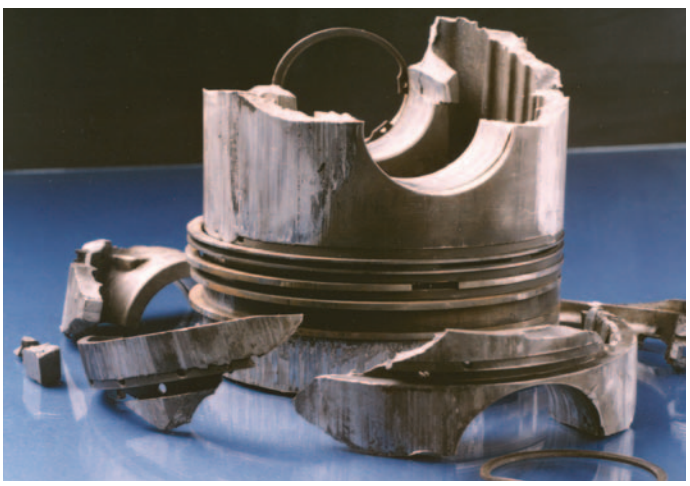
While temperature, pressure and vibration sensors all have their part to play in a condition monitoring package, early detection of changes in oil and lubricant condition and regular, consistent monitoring of wear metal debris in rotating plant provide greater insight into the actual condition of vital machinery and equipment. Real-time monitoring of the root cause lubricant and machine failure will allow you to take immediate action on the first indication of change. Suitable for use with slow, medium and high speed diesel engines, gas turbines, gearboxes, compressors, generators, vehicles and other oil filled plant, these sensors help to increase productivity, reduce costs and improve profitability. Use the range of online sensors to put your oil analysis laboratory on your doorstep.

The range of sensors includes Oil Condition, Moisture, Total Ferrous Wear Debris and Metallic Particle. The sensors can be purchased separately, or as part of a suite. Online Sensors:

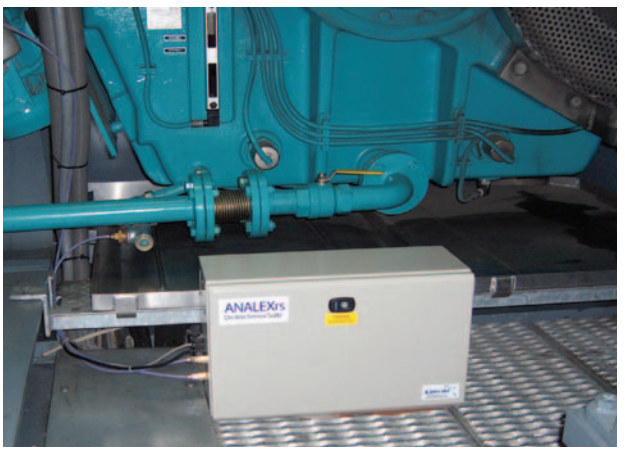
- Can be used in Remote Locations where continuous monitoring is not always possible by engineers.
- Monitor the presence of wear debris materials that signal a changing wear rate and hence the need for intervention.
- Monitors the presence of contaminants and moisture that may cause change in the oil condition.
- Rugged design and suitable for nearly all applications.
- Multiple outputs, the sensors can be easily incorporated into your existing condition monitoring and operating control systems.

Benefits

- Proactively monitor critical fluids allowing early maintenance intervention to prevent failure.
- Control the wear rate to ensure longer service life.
- Increase the surveillance level of the machine between oil samples.
- Low cost of purchase and ownership.
- Minimal annual servicing costs.
- Minimal installation costs.



Online Sensor Suite



A combination of the sensor range, the 'sensor suite' has been developed to offer real-time monitoring on critical plant such as a wind turbine gearbox. Using its own piston pump the sensor suite makes frequent inspections of remote oil and machine health a feasible option. The risk of sampling error is eliminated and data from the sensors can be streamed via any network system, allowing remote monitoring and increasingly effective maintenance planning.

Designed for mounting into the lubrication system of a machine, the suite reports metallic ferrous wear debris, oil condition, and the moisture content of the oil. Housed in a robust box it includes the Total Ferrous Sensor (Piston Version), Moisture Sensor and Oil Condition Sensor.

Technical Specifications

Ambient Operating Temperature: Ambient Operating	0 to 70°C (32 - 158°F)
Temperature Heated Version:	-20°C to 70°C (-4 - 158°F)
Analogue Communication Interfaces:	4-20mA
Detection:	0-2000 parts per million [ppm] Un-combined ferrous debris by weight, Oil Quality Units – Index Scale, 0-100% Relative Humidity, -20 – 120°C Temperature
Digital Communication Interfaces:	RS232, RS485, CAN Bus
Fluid Compatibility:	Petroleum, synthetic oils – not ester based
IP Rating:	IP65
Max. System Fluid Pressure:	10 Bar (145psi)
Max. Fluid Viscosity:	350 cst
Permitted Fluid Temperatures:	10 to 70°C (50 – 158°F)
Power consumption :	0.8 A
Power Input:	18 – 30V DC
Weight:	15kg (33lbs)

Ordering Infomation

Product Code	Description
FG-K16521-KW	Standard Sensor Suite
FG-K16567-KW	Heated Sensor Suite

All sensors come complete with software for data downloading and trending.

Contact Kittiwake for information about the wide range of installation accessories and alternative sensor suite combinations that are available to suit your specific application.

Financial Benefits Example: Wind Turbine Gearbox

As wind turbines become larger and more complex, the power produced from them increases but so can the maintenance costs. There have been many well publicised failure events which have been very costly to the owners, manufacturers and to the general perception of wind as a renewable energy source. One such event was the failure of all 30 2MW turbines installed at Scroby sands in the UK. All failures occurred within one year of installation. Using data provided from a gearbox manufacturer, the total cost of removing, overhauling and reinstalling a gear box can be up to €450,000*. This can be due to the turbines inaccessibility, crane rental, man hours used and loss of earnings on the turbine. If sensor equipment detects a potentially serious problem before it becomes too advanced and the repair could happen without the need for a crane then the repair bill could be a fraction of this cost. If a sensor detected oil contamination such as water in the oil or oxidation which could lead to a serious failure then the turbine could be saved by just replacing the oil this could be a €450,000 saving.

* Data taken from "the industrial gearbox life cycle and the total cost of ownership" by Gary Bills – Hansen Transmissions – BGA Gears 2006 Seminar

Metallic Particle Sensors

The Metallic Particle Sensor goes beyond the normal wear debris sensors to offer even greater size resolution. With an unbeatable detection range the sensor provides a debris count for both ferrous and non-ferrous metals. Now you can monitor how dirty your oil is, real-time.

Its no secret that particles cause wear. Its is imperative to know, not just the number of particles which pass through your system, but also the size. Using the Metallic Particle Sensor allows you to now you can monitor real-time. And take immediate action on the first indication of change. It goes beyond the normal protection systems; it prevents failure, not just catastrophic failure.

The Metallic Particle Sensor can be mounted within almost any lubrication system on any type of machine. The sensor measures ferrous and non-ferrous metals, resulting from the wear debris within the lubricant, using a combination of proven inductive coil technology, combined with smart algorithms to provide a particle size distribution count. And that puts you in control. You know that the more severe the wear problem, the more that the machine produces larger wear debris particulate.

With its digital and analogue outputs, it can be easily integrated into your existing Condition Monitoring and operating control systems. It puts you in control. Whether it's to check on the health of the machine, or an alert of changing wear patterns, the sensor provides instant information, complementing your existing laboratory oil analysis programme, and helping you make informed maintenance planning decisions.

Technical Specifications

Ambient Temperature:	-20 to 65°C (-4 to 149°F)
Analogue Outputs:	2 x Opto isolated 4-20mA, 1 x Alarm contacts (0.1A max)
Communications:	RS232, RS485 (Modbus option available)
Connections:	3/8" BSPP female
Detection:	40 micron (0.04mm) [0.00157 inch] Ferrous Metal 135 micron (0.135 mm) [0.00531 inch] Non-Ferrous Metal
Output:	Simultaneous quantification of metallurgical composition and size category of particles in a fluid
Fluid Compatibility:	Petroleum, synthetic oils and water/oil emulsions
Fluid Temperature:	-20 to 65°C (-4 to 149°F)
Flow Rate:	0.3 - 4.5m/s
Sensor Bore:	Diameter 10mm, Length 120mm
Max Fluid Pressure:	10 Bar (145psi)
Max Fluid Viscosity:	500cst
Power Supply:	18-30v DC
Protection:	IP65
Weight:	1.5kg (3.3lb)

Ordering Infomation

Product Code	Description
FG-K16121-KW	Metallic Particle Sensor
FG-K16355-KW	Metallic Particle Sensor Evaluation Pack, includes case, power supply and display

All sensors come complete with software for data downloading and trending. Contact Kittiwake for information about the wide range of installation accessories and alternative options that are available to suit your specific application.

3/8" BSP connections for quick and easy installation

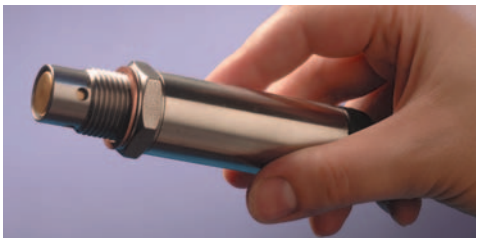
Sealed to IP65 suitable for industrial use

Robust cast iron enclosure providing strength and magnetic shielding

LED display providing a visual indication of sensor status

Wide range of interface options due to variety of industry standard outputs

Oil Condition Sensors



The Oil Condition Sensor goes beyond the normal protection systems; it monitors the root cause of lubricant and machine failure. It puts you in control. You know exactly when to change the oil based on condition, not on historical schedules.

Today's lubricants are better quality than ever before. Sticking to old service schedules is expensive and extending oil service life isn't guesswork. Whilst lubricants perform better, you know they are still at risk from changing operating and environmental conditions. That's why your oil analysis service includes an oil condition feedback. It helps you detect when your oil may no longer be fit for service, possibly even pinpointing a contaminant or machine fault as the cause.

The Oil Condition Sensor goes beyond the normal hand-held field go/no-go units to offer permanent mounting. Providing both a check on water ingress and oxidation levels, now you can monitor real-time, and take immediate action on the first indication of change before any harm is done to the machine or the oil. The oil condition Sensor can be mounted within almost any lubrication system on any type of machine. The sensor detects changes caused by water and acid levels, using a combination of proven dielectric sensing, combined with smart algorithms to provide a trend.

Whether it's to check on the health of the lubricant, or an alert of changing contaminant ingression, the Oil Condition Sensor provides instant information, complementing your existing laboratory oil analysis programme, and helping you make informed maintenance planning decisions.

Technical Specifications

Ambient Temperature:	-20 to 70°C (-4 to 158°F)
Analogue Outputs:	4-20mA
Digital Outputs:	CAN, RS232
Connections:	1/2" BSP male thread
Detection:	Oil Condition (Oil Quality Units)
Fluid Compatability:	Petroleum and synthetic oils
Fluid Temperature:	-20 to 130°C (-4 to 266°F)
Max Fluid Pressure:	10 Bar (145) psi
Options:	Variable sensor head reach, Power supply, Stand alone display unit, Cable termination options by special request
Power Supply:	15-30 VDC
Protection:	IP67
Range:	0-100 Oil Q Units
Repeatability:	4%
Weight:	250g (9 oz)

Ordering Infomation

Product Code	Description
FG-K16203-KW	Standard Reach, Analogue Output
FG-K14492-KW	Long Reach, Analogue Output
FG-K16330-KW	Standard Reach, Analogue & Digital Output
FG-K16340-KW	Long Reach, Analogue and Digital Output
FG-K16318-KW	Evaluation Pack Standard Reach, Dual Outputs, includes case, power supply and display
FG-K16327-KW	Evaluation Pack Long Reach, Dual Outputs, includes case, power supply and display

All sensors come complete with software for data downloading and trending. Contact Kittiwake for information about the wide range of installation accessories and alternative options that are available to suit your specific application.

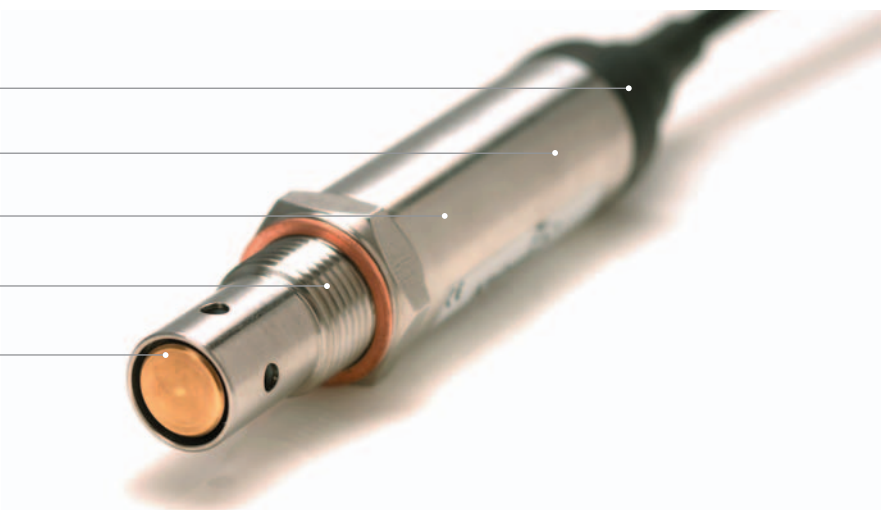
High integrity sealing, using standard automotive techniques.

Internal processing power offers wide interface options.

Stainless steel housing - rugged and long life performance

Widely used 1/2" BSP thread - quick and easy installation to a wide range of machinery

Gold oil sensing contact - long life and sensitivity



Moisture Sensors

The Moisture sensor goes beyond the normal water screening tests to tell you exactly how dry your oil is. You know that the more severe the moisture ingression problem, the greater the potential risk. You can ensure that your oil is always below the saturation point before free and emulsified water starts to form. And take immediate action on the first indication of change.

You probably already know that free and emulsified water cause problems. But, did you know that water can increase the oxidation rate of your lubricant by more than ten times? That's why your oil analysis service includes a water-screening test. But were you aware that bearings could lose 75% of their potential service life due to water before the oil even begins to start to look cloudy? Even in its dissolved state the water is at work, attacking the base stock, the additive package, and the machine. Plus, water can carry organisms with it that could disable your critical hydraulic systems.

Providing a % Relative Humidity (RH) and temperature values, now you can monitor real-time, the Moisture sensor can be mounted within any lubrication system on any type of machine. Moisture sensors need not be in the fluid to be effective and are also of use in the headspace of a piece of machinery. The sensor measures the oils percentage Relative Humidity, resulting from the dissolved water within the lubricant, using a combination of proven thin film capacitance sensors, combined with smart algorithms to provide a temperature and % RH value.

Whether it's to check on the health of the machine, or an alert of changing moisture ingression rates, the Moisture sensor provides instant information, complementing your existing laboratory oil analysis programme, and helping you make informed maintenance planning decisions.

Technical Specifications

Accuracy Saturation:	+/-2 %
Accuracy Temperature:	+/-1 °C
Alarm Defaults:	Saturation: on at 65% (open), off at 60% (closed)
Analogue Outputs:	4-20mA for % Saturation, 4-20mA for temperature of oil, open collector for alarm.
Calibration:	ISO/IEC 17025, NIST & NPL Traceable
Connection Method:	By multicore screened cable
Digital Inputs :	RS232, CAN
Digital Outputs :	CAN, RS232
Fluid Compatibility:	Petroleum and synthetic oils
Material:	304 Stainless Steel
Max Oil Pressure:	10 bar (145psi)
Oil Temperature Range:	-40 to 100 °C (-40 - 212°F)
Power Supply :	12-30 Vdc <1w
Sealing on enclosure:	IP67
Weight:	0.3 Kg

Ordering Infomation

Product Code	Description
FG-K16947-KW	Standard Reach - Analogue Output
FG-K16950-KW	Long Reach - Analogue Output
FG-K16946-KW	Digital - Standard Reach, Digital Output
FG-K16949-KW	Digital - Long Reach, Digital Output
FG-K16948-KW	Evaluation Pack Standard Reach, Dual Outputs, includes case, power supply and display
FG-K16951-KW	Evaluation Pack Long Reach, Dual Outputs, includes case, power supply and display

All sensors come complete with software for data downloading and trending. Contact Kittiwake for information about the wide range of installation accessories and alternative options that are available to suit your specific application.

Stainless steel housing - rugged and long life performance

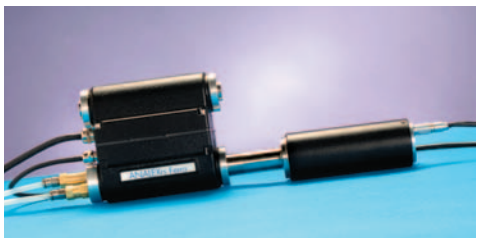
Smart sensor with internal processing power offers wide range of interface options

High integrity sealing, using standard automotive techniques.

Widely used 1/2" BSP thread - quick and easy installation to a wide range of machinery

High pressure resistant glass to metal hermetetic seal

Total Ferrous Debris Sensors



The range of Total Ferrous Debris Sensors place you in complete control of your maintenance. Whether it's to check on the health of the machine, or an alert of changing wear patterns, the Total Ferro Debris Sensor provides instant information, complementing your existing oil analysis programme, and helping you make informed maintenance planning decisions.

Machines give telltale indicators of potential problems. Any change in the wear pattern is going to result in changes in the ferrous density. The Total Ferro Debris Sensor goes beyond the normal chip detectors and magnetic plugs. Providing a ppm value, you can monitor real-time and take immediate action on the first indication of change.

The Total Ferrous Debris Sensor can be mounted within almost any lubrication system on any type of machine. The sensor measures ferrous density, resulting from the wear debris within the lubricant, using a combination of proven magnetometry, combined with smart algorithms to provide data in Parts Per Million (ppm). With the digital and analogue outputs, airblast and piston options the total ferrous sensors can be easily integrated into your existing condition monitoring and operating control systems.

Technical Specifications

Ambient temperature:	-20 to 65°C (-4 to 149°F)
Analogue Output:	Opto isolated 4-20mA
Communications:	CAN, RS232, RS485, (802.11b WLAN)
Connections:	Piston 1/8" BSP,
Detection:	Total Ferrous Wear Debris
Fluid Compatibility:	Petroleum, synthetic oils and water/oil
Fluid Temperature:	-20 to 65°C (-4 to 149°F)
Max. Fluid Pressure:	10 Bar (145psi)
Options:	Stand alone unit, Unit with automatic piston zeroing, Display/Alarm box,
Power Supply:	18-30 VDC
Protection:	IP65
Range:	0-2000 ppm Uncombined Ferrous Debris
Weight:	2.2kg (4.85lb)
Fluid Viscosity:	350cst (Piston Version & Non Zeroing Option)

Ordering Infomation

Product Code	Description
FG-K16344-KW	Piston Version
FG-K16354-KW	Evaluation Kit Piston Version, includes case, power supply and display
FG-K16590-KW	Non Zeroing Option

All sensors come complete with software for data downloading and trending. Contact Kittiwake for information about the wide range of installation accessories and alternative options that are available to suit your specific application.

Available for use in a multitude of applications

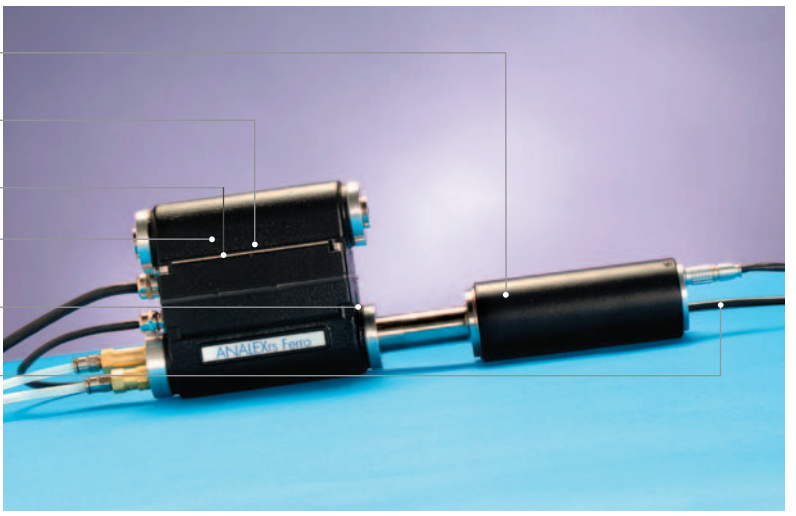
Robust cast iron enclosure providing strength and magnetic shielding

Sealed to IP65 suitable for industrial use

Reference coil for controlled temperature stability

LED display providing a visual indication of sensor status

Wide range of interface options due to variety of industry standard outputs



KITTIWAKE
monitoring innovation

Kittiwake Developments Ltd
3 - 6 Thorgate Road Littlehampton
West Sussex BN17 7LU United Kingdom
Tel: + 44 (0)1903 731470
Email: sales@kittiwake.com
Web: www.kittiwake.com

MA-K27471-KW Issue 5