

## WearSens® WS3000 - a new approach to gearbox and bearing failure prevention, online and continuous!



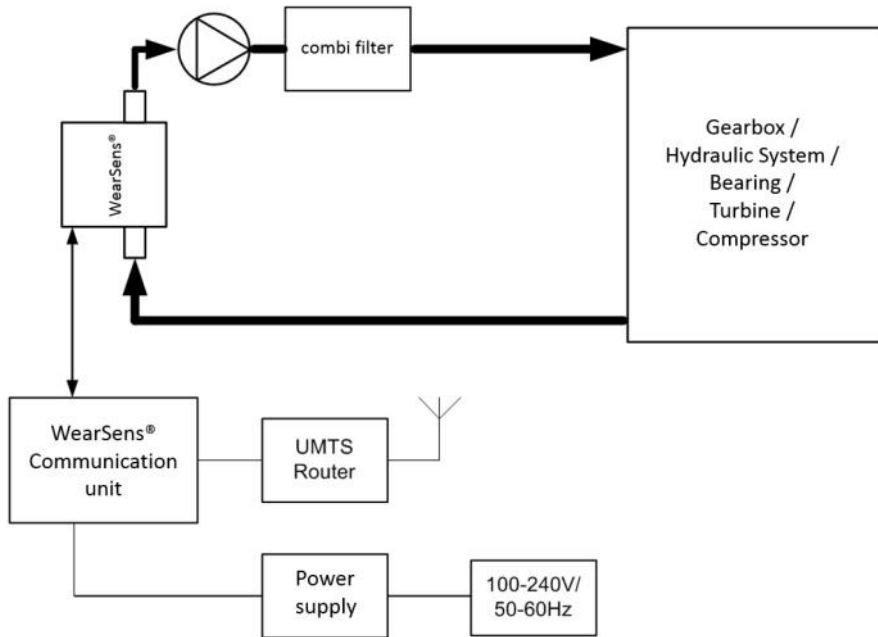
### Features

- Optimises load, reduces wear
- Detect change before wear damage
- More sensitive than vibration monitoring, more sensitive than lab analysis
- Easy to install or retro-fit
- Web based, decentralised monitoring
- Condition Based Maintenance — large cost savings

### Applications

- Wind turbine gearboxes
- Contamination detection
- Roller bearing wear detection
- Oil deterioration monitoring
- Oil Condition monitoring solution

## WearSens® WS3000 - a new approach to gearbox and bearing failure prevention, online and continuous!



**WearSens® is a unique, new system for online oil condition monitoring.** Early indication of oil changes leads to optimum loading and/or timely preventative maintenance. The result, huge savings in money, downtime and man hours.

**Change in oil is one of the precursors of particle shearing and pitting in the bearing raceway.** Early detection can warn of potential damage states, before damage occurs.

**WearSens® works from day 1, prior to other technologies limits of detection.** Tests have shown that the WearSens® can detect deterioration in oil while standard laboratory analysis still reports oil as good. Vibration and particle monitoring only detect after damage is done.

**Conductivity, permittivity and temperature are measured** with high precision. Both conductivity and permittivity are temperature dependent, but the temperature compensation for any pollutants is unknown. WearSens® features a self-adapting temperature compensation algorithm similar to a neural network.

**Conductivity is measured in picosiemens per metre.** This sensitive conductivity measurement indicates the formation of compounds from broken oil molecules, the presence of microparticles and the consumption of any additives. The temperature compensated values allow comparison at any time.

**Relative permittivity is a measure of the dielectric constant.**

Permittivity decreases as additives are used up but will then increase once all additives are consumed. Taken in conjunction with the conductivity values, a clear picture emerges of the changes in the oil.

**The web based, decentralised monitoring system** is perfect for remote or inaccessible locations. Measurements are transmitted via LAN, WLAN or the serial interface.

**Conceived, developed and manufactured in Germany the WearSens®** represents a completely new approach to oil condition monitoring in a variety of applications. For the first time, changes in oil can be detected accurately, online and continuously. The result, optimised loading, reduced wear and cost savings.

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—> Various Applications! What is yours?



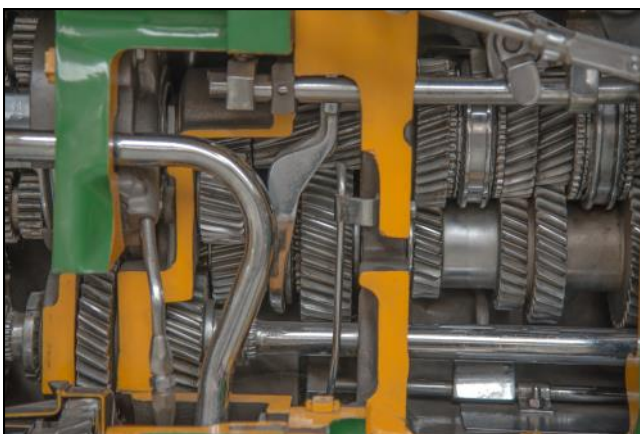
Marine



Heavy machinery



Offshore Wind Turbines



Automotive test rigs



Mining

## Specification

### Ranges

Conductivity: 0.1 to 100,000 pS/m  
(optional, high range: 0.1 to 2.000.000 pS/m)  
Relative permittivity: 1 to 5

### Sensitivity

Conductivity: 0.1 pS/m  
Relative permittivity:  $1 \cdot 10^{-6}$

### Temperature and pressure

Max oil pressure: 60 barg at 20°C  
(870 psig at 68°F)  
Oil temperature: -10°C to +70°C  
(optional, high temperature: -10° to + 150°C)  
(optional, low temperature: -40° to + 65°C)  
Operating temperature: -20°C to +70°C

### Material:

Sensor material: Stainless steel  
(bowl and carrier) and aluminium (head)  
Cable: 3 metre, shielded  
(optional, different cable length)

### Connections:

¼" Swagelok® for 6mm o.d. tube  
(optional connectors available)

### Communication Interface:

Serial communication via RS232/RS232-USB  
(opt.: LAN, GSM, Profibus, Modbus, CAN,  
0..10V, 0/4..20mA)

### Electrical requirements:

115/230 VAC, 50/60 Hz (optional, +24 VDC)

## Weights and Dimensions

### Dimensions (mm):

Sensor: 103 (height) x 70 (diameter)  
Communication unit: 210 x 250 x 165  
Communication module: 87 x 110 x 30

### Weights net:

Sensor: 1.7 kg  
Communication unit: 4.45 kg  
Communication module: 0.25 kg

## cmc Instruments GmbH

Rudolf Diesel Strasse 12 A  
D-65760 Eschborn  
Germany  
Tel: +49 6173 320078  
Fax: +49 6173 65050  
info@cmc-instruments.de  
www.cmc-instruments.de

## Ordering Information

Part No.	Description
WearSens® WS3000	Consist of base sensor and communication unit with communication module, standard sensor cable length of 3 meter, serial communication via RS232 / RS232 to USB interface, 115/230 VAC, 50/60 Hz power supply
<b>Options</b>	
-HC	High Conductivity Range (0.1 to 2.000.000 pS/m)
-HT	High Temperature Range (-10°C to + 150°C)
-LT	Low Temperature Range (-40°C to +65°C)
-LAN	LAN Interface, enables data transfer via TCP/IP
-GSM	GSM Interface, enables mobile data transfer via 3G phone network (SIM card has to be provided by the customer, requires LAN interface)
-PROFIBUS	PROFIBUS Interface (replaces standard RS232 interface)
-MODBUS	MODBUS Interface (replaces standard RS232 interface)
-CAN	CANBUS Interface (replaces standard RS232 interface)
-AO_XY	Analog Output: 0..10V or 0/4..20mA (X = numbers of channels to be transmitted, Y = V for voltage output or A for current output)
-1Z	1 inch connector block (replaces the standard sensor connector block)
-24VDC	+24 Volt DC power supply connector (replaces the standard power supply using the more compact communication module for easy installation into existing electrical cabinets)
<b>Accessories</b>	
-PC	PLA Protection cap for the base sensor during transport
<b>Service &amp; spares</b>	
WS-OR-NBR	O-ring for base sensor, optimized for Diesel applications
WS-OR-FKM	O-ring for base sensor, standard applications
WS-FCC	Factory Calibration Certificate

Patent pending EP 2 163 887



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