LCIE Laboratoire de Moirans Z.I. Centr'Alp 170, Rue de Chatagnon 38430 MOIRANS-FRANCE



## **GENERAL INFORMATION**

FCCID:

2AC3Z-EGL1102

### 1.1. Product description





### WIRELESS ONLINE CONDITION MONITORING SOLUTION

**EAGLE** is a smart wireless sensor that is easy to set up and allows you to continuously monitor the health status of rotating machinery. Any manufacturer can enhance the reliability of its production tools in the simplest way possible, freeing itself of the restrictions inherent in setting up standard wired solutions.

**EAGLE** guarantees a drastic reduction of installation costs in severe environments or where preliminary engineering phases are necessary.

With its unique measurement capabilities, **EAGLE** is the first wireless solution without compromise on diagnosis capabilities. All types of industrial rotating machines can be monitored, thereby enabling you to increase the overall reliability of your industrial installed base.

### EAGLE DIAGNOSIS CAPABILITIES

Post-processing	On Time Waves	Filters: High Pass, Low Pass, Band Pass Shock Finder smart filter		
		High Resolution Spectra (400 to 6400 lines), concatenation		
		Automatic parameters : Statistic levels (RMS, peak, peak-peak, mean), Kurtosis		
	On spectra	Automatic parameters : Peak Extraction, Energy Narrow band Level, Energy broadband level		
		Bearings frequencies, gear frequencies		
		Cepstra (automatic or manual)		
	On parameters	Logic combination of parameters		
Advanced thresholds	Alarm thresholds levels	4 levels (pre Alarm, Alarm, Danger, Error)		
	Standard thresholds types	HIGH level thresholds, LOW level threshold, IN RANGE thresholds, OUT OF RANGE thresholds,		
	Advanced thresholds types	Evolution vs. previous control, Evolution vs. reference date, Statistic, Forecast		
Data mining	Operating condition	Trend filtered per operating condition for variable operating condition machines		
	History	Trends, waterfall		
		Filter on controls history from parameter trend.		
	Comparison	Superimposition of parameters, spectra, time waves		
	Quick access to results	Quick look matrix : the machine health in one view of all alarm status (4DG)		

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# 🕘 OneProd

Eagle Sensor						
Performances	Axis	Uni-axial or Tri-axial				
	Sensing element	Piezoelectric ceramic, shear mode piezo				
	Accuracy	±5% @160Hz				
	Amplitude Range	± 50 g peak, 24 bit				
	Frequency Response @ ±3dB	1 Hz to 15k Hz	6k Hz for X and Y axis			
	Background noise	0,5mg RMS				
	Transverse Sensitivity (Typ.)	<5%				
	Lemperature measurement range	-20°C to 120°C (-4°F to 248°F)	±1 °C accuracy, 0.1 °C resolution			
	Time unsueform number of points 1	200 to 51.2K HZ	FFT resolution 900 to 2000 lines			
	Maximum recording duration	0.2 to 64r	FFT resolution solo to 3200 lines			
	Smart concer	U.3 to bes For machine speeds ≥ 100 RPM				
	Acquisition modes	Embedded FFT, Overall velocity and Overall Acceleration				
	Vibration limit / Shock limit	500g peak / 5000g peak				
Eagle Sensor and	Expander	oog peak i oovog peak				
Physical	Size and weight	Ø48 mm, 113mm high, 403 grams	44mm wrench and dedicated tool			
-	Case material 3	316L Stainless steel	Reinforced, UV stabilized polyamide			
		140 4 da	Option: cementing pads and tri-axial			
	Mounting °	M6 x 1 thread	orientation mounts			
	Sealing	IP67	O-ring			
Electrical	Standard battery	Li-SOCI <sub>2</sub> , D cell, 3.6V, 1.7Ah	SAFT LS33600			
	Autonomy 4	5 years at typical usage, non-rechargeable				
Operating	Humidity limits	< 95% RH non-condensing				
requirements	Standard operating temperature <sup>2</sup>	-20°C to 85°C (-4°F to 185°F)	Extreme temperatures reduce optimum battery life			
	Solvent resistance 3	Solvents resistant				
	Hazardous environments	IM1 G Ex ia Ma, II 1 G Ex ia IIC Ga T4	Class I, Div I			
Earla Catavar		T4 -20/+60°C	T4 (-4°F to 140°F)			
Eagle Gateway Technical	Power supply	48V 0.54 PoE injector (IEEE802.3 af)				
	Size	220x120x38mm 360n				
	Material	Polycarbonate	BAL 7035			
	Enclosure / dust & water	IP67 case and IP68 gland	NEMA 4. 4X. UL 94-V0			
	Temperature range	-20°C to 60 °C (-4°F to 140°F)				
	Relative humidity	< 95% RH non-condensing				
	Hazardous environments	II 3 G EEx ic IIC Gc T4 T4 -20/+60°C	Class I, Div II			
	Ethernet channel	10/100 Base-T Ethernet Channel, RJ45 connector	Standard ethernet class 5e cables			
	Antenna	Embeded omnidirectional antenna	External antenna			
	Mounting	Tough Ball joint mounting				
		rough builjoint mounting				
	IT and networks	TCP/IP, HTTP, REST/XML, DHCP				
Features	IT and networks Variable Operating condition machines	TCP/IP, HTTP, REST/XML, DHCP Modbus TCP				
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Features Eagle system Wireless communication	IT and networks Variable Operating condition machines Sensors network configuration Network standard Physical layer (PHY) Frequency	TCP/IP, HTTP, REST/XML, DHCP Modbus TCP Gateway Web Interface ISA100.11a compliant IEEE 802.15.4 2.4 GHz ISM band	International license-free			
Features Eagle system Wireless communication	IT and networks Variable Operating condition machines Sensors network configuration Network standard Physical layer (PHY) Frequency Security	TCP/IP, HTTP, REST/XML, DHCP Modbus TCP Gateway Web Interface ISA100.11a compliant IEEE 802.15.4 2.4 GHz ISM band 128-bit AES encrypted packets	International license-free			
Features Eagle system Wireless communication	IT and networks Variable Operating condition machines Sensors network configuration Network standard Physical layer (PHY) Frequency Security Output power (peak)	TCP/IP, HTTP, REST/XML, DHCP Modbus TCP Gateway Web Interface ISA100.11a compliant IEEE 802.15.4 2.4 GHz ISM band 128-bit AES encrypted packets 3dBm sensor / 14dBm Expander and gateway	International license-free			
Features Eagle system Wireless communication	IT and networks Variable Operating condition machines Sensors network configuration Network standard Physical layer (PHY) Frequency Security Output power (peak) Reception sensitivity	TCP/IP, HTTP, REST/XML, DHCP Modbus TCP Gateway Web Interface ISA100.11a compliant IEEE 802.15.4 2.4 GHz ISM band 128-bit AES encrypted packets 3dBm sensor / 14dBm Expander and gateway -101dBm	International license-free			
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Features Eagle system Wireless communication	IT and networks Variable Operating condition machines Sensors network configuration Network standard Physical layer (PHY) Frequency Security Output power (peak) Reception sensitivity Wireless range <sup>6</sup> Sensors-Expander-Expander-Gateway Max number of hops Max. sensors per gateway <sup>7</sup>	TCP/IP. HTTP. REST/XML, DHCP         Modbus TCP         Gateway Web Interface         ISA100.11a compliant         IEEE 802.15.4         2.4 GHz ISM band         128-bit AES encrypted packets         3dBm sensor / 14dBm Expander and gateway         -101dBm         50m - 50m - 100m / Line of sight         30m - 30m - 80m / ndustrial environments         8 hops (extends wireless range)         30 direct nodes, 150 sensors using expanders	International license-free Wireless range is highly dependant on the environment, height and orientation. 500m line of sight / 240m in industriel environments edepending on expanders and measurements scheduling			

01dB METRAVIB SAS – 200 Chemin des Ormeaux – 69578 LIMONEST – France – Tel: +33 (0)4 72 52 48 00 www.acoemgroup.com LCIE Laboratoire de Moirans Z.I. Centr'Alp 170, Rue de Chatagnon 38430 MOIRANS-FRANCE



### **Tested System Details** 1.2.

<u>Power supply:</u> During all the tests, EUT is supplied by  $V_{nom}$ : 3.6VDC For measurement with different voltage, it will be presented in test method.

Name	Туре	Rating	Reference / Sn	Comments
Battery	🗆 AC 🗆 DC 🗹 Battery	3.6VDC		

### Inputs/outputs - Cable:

Access	Туре	Length used (m)	Declared <3m	Shielded	Under test	Comments
	Ν	lone				

### Auxiliary equipment used during test:

Туре	Reference	Sn	Comments
Laptop DELL	Precision	8P3J5S1	-
ITE power supply	PW180KB4800N01	-	-
GATEWAY	-	EAGLE- 0009B3	Used in "Remote"
			mode

### **Equipment information:**

Туре:	ZIGBEE						
Frequency band:	[2400 – 2483.5] MHz						
Sub-band REC7003:			Anne	x 3 (a)			
Spectrum Modulation:			$\ \ \square \ \ \square \ \ \square$	SSS			
Number of Channel:			1	6			
Spacing channel:			5M	IHz			
Channel bandwidth:			2M	IHz			
	☑ 1					□ 4	
Transmit chains:	☑ Single antenna		□ Sym	metrical		□ Asymmetrical	
	Gain 1: 3dBi	Gai	n 2: dBi	Gain 3:	dBi	Gain 4: dBi	
Beam forming gain:	$\Box$ Yes:	dB		⊠ No			
Receiver chains	☑ 1		$\Box 2$			□ 4	
Type of equipment:	☑ Stand-alone		🗆 Pl	🗆 Plug-in			
Ad-Hoc mode:				⊠ No			
	□ Yes (Load Based)		□ Off mode		⊠ No		
Adaptivity mode:	Clear Channel Assessment Time:			None			
	q value for Load Based Equipment:			: None			
Duty cycle:	🗹 Continuous duty 🛛 🗆 In		🗆 Intermi	ermittent duty		□ Continuous operation	
Equipment type:	☑ Production model			□ Prototype			
Module reference:	AT86RF233-ZU						

	Tmin:	$\square$ -20°C $\square$ 0°C $\square$		
Temperature range:	Tnom:	20°C		
	Tmax:	□ 35°C	□ 55°C	⊠ 85°C
Test source voltage:	$\Box$ AC:	$\Box$ DC:	☑ Battery: 3.6VI	DC / Lithium-Ion

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**CHANNEL PLAN** Channel Frequency (MHz) **Cmin: 11** 2405 2410 12 13 2415 14 2420 15 2425 16 2430 17 2435 **Cmid: 18** 2440 19 2445 20 2450 21 2455 22 2460 23 2465 24 2470 Cmax: 25 2475

\*Not used by the provider.

DATA RATE					
Data Rate (Mbps)	Worst Case Modulation				
0.25	O-QPSK	$\checkmark$			

2480

The EUT is set in the following modes during tests with simulator / software (Unknown):

The command is send by Gateway in "Remote" mode.

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- Permanent emission with modulation on a fixed channel in the data rate that produced the highest power

- Permanent reception

- The power is set at 3dBm

### 1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4-2003, FCC Part 15 Subpart C.

Radiated testing was performed at an antenna to EUT distance of 10 meters. During testing, all equipment's and cables were moved relative to each other in order to identify the worst case set-up.

### 1.4. Test facility

Tests have been performed from October 13th to 21th, 2014.

This test facility has been fully described in a report and accepted by FCC as compliant with the radiated and AC line conducted test site criteria in ANSI C63.4-2003 in a letter dated March 25<sup>th</sup>, 2008 (registration number 94821). This test facility has also been accredited by COFRAC (French accreditation authority for European Union test lab accreditation organization) according to NF EN ISO/IEC 17025, accreditation number 1-1633 as compliant with test site criteria and competence in 47 CFR Part 15/ANSI C63.4 and EN55022/CISPR22 norms for 89/336/EEC European EMC Directive application. All pertinent data for this test facility remains unchanged.

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