

BeCOMS® EM ADVANTAGES

Conventional Monitoring System	BeCOMS® EM system
Based on vibration & temperature measurements	Based on friction detection of moving parts
Measurement can only be taken using handheld mechanical measuring instruments (PLS) to be performed by an investigator	Friction detected at earliest stage is captured by evaluator with/without PC
So-called limits to be decided by expert in this field	If pre-set detection limit is reached alarm is triggered automatically. Operator may take action
Predictions for long term are difficult to be taken	Continuous monitoring of development of friction is registered in data records
Need important amount of same type measurements for comparison	Can load data into PC for independent detailed analysis
Difficulty to measure data since vibrations could be caused by many factors	Specific measurement of friction caused by moving parts within machine bearings
No continuous monitoring because measuring equipment is separate from motor	Actual time monitoring due to BeCOMS being simply mounted onto existing motors
High costs of engaging an expert	Reduces measuring costs
Expert's opinion is subjective	Data readings are absolute and reliable

TECHNICAL DATA

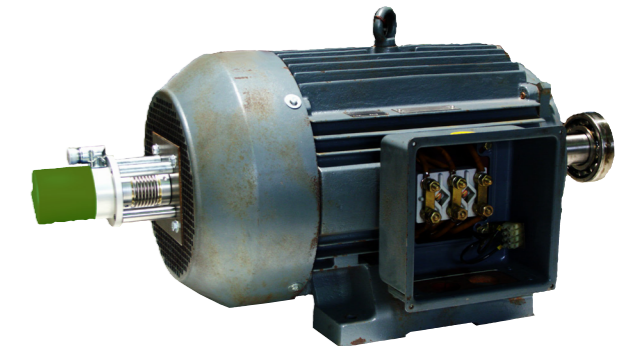
Power supply	24V DC +30% / -25%
Power consumption	continuous 0.8A, peak at startup max. 2.0A
Alarm level	adjustable in: • 5 steps for Thermosignal • RPM for overspeed alarm
Outputs	3 isolated relay contacts: • Shutdown Main alarm • Pre-alarm • System Ready
Data interface	• RS485 to PC • Modbus (RS422 or RS485) • CAN bus (optional)
Ambient temperature	0 - 70°C for Evaluator 0 - 85°C for SRT

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BeCOMS® EM

Bearing Condition Monitoring for Electrical Machines

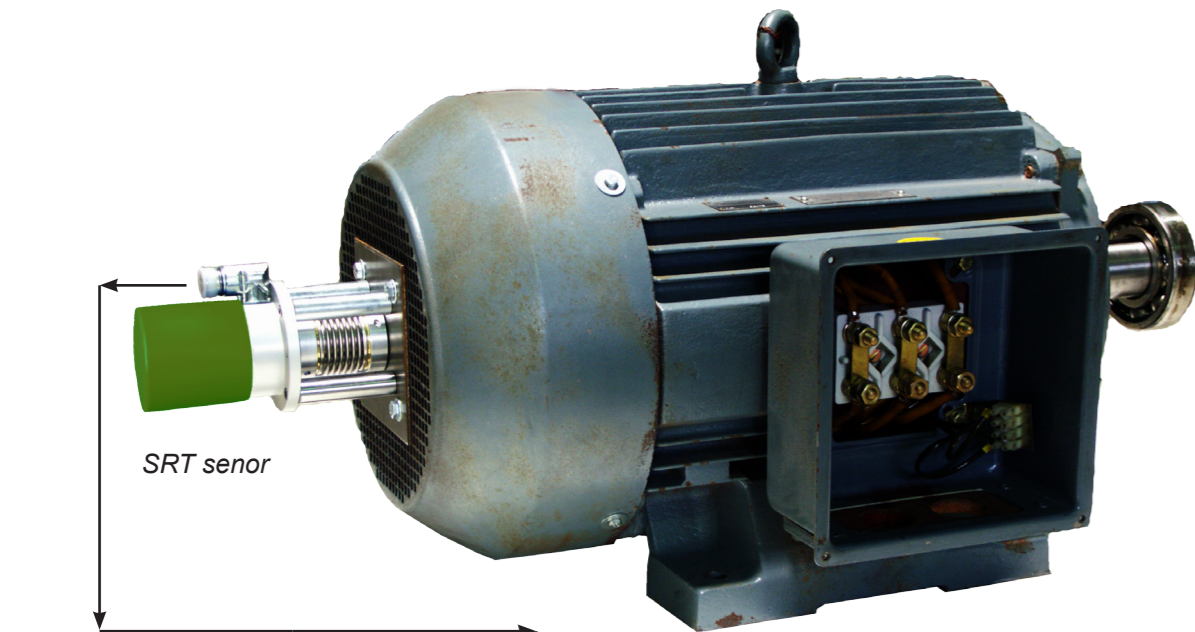
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INTRODUCTION

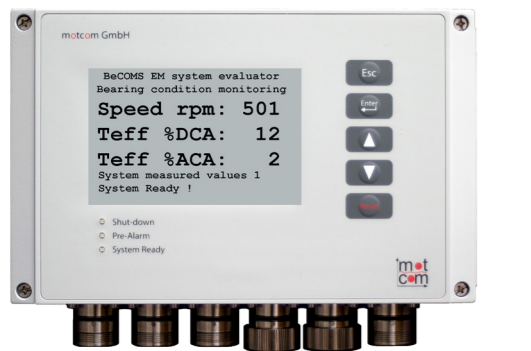
Damages to bearings can be caused by metal particles within the bearing clearance, low oil pressure, overheated oil, etc. The result of such malfunctions is a breaking oil film between the sliding parts. As soon as the oil film is broken an electric potential difference occurs due to the friction between the different metallic alloys.

SLIP RING TRANSMITTER (SRT)

The Slip Ring Transmitter (SRT) contains a special slip ring with redundant carbon brushes which receives the electric potential difference signal from the shaft-bearing system. The SRT is also equipped with an incremental encoder to bring the measured signal in relation to the rotation of the shaft. It is mounted to the machine shaft with an specific adapter. The construction is designed to withstand vibration.



SRT sensor



SRT sensor

RS485 interface

Relay output

Power

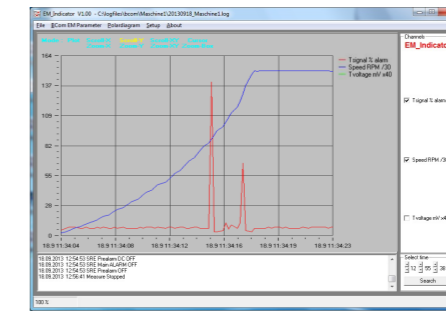
EVALUATOR

The Evaluator is designed to withstand the environment in Industries. Its vibration resistance allows an installation near the machine without any special support. The Evaluator consists of a alloy case, a liquid crystal display (LCD), three LEDs indicating the system status and five membrane buttons for user interaction. A powerful microcontroller inside the Evaluator analyzes the measured data continuously, displays the data on the LCD and triggers the alarm relais in case of thermo voltage. The bargraph display makes recognizing the current measurement data easy.

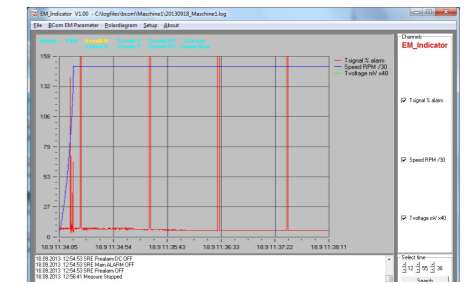
FUNCTIONAL DESCRIPTION

Online monitoring of bearing conditions is based on measurement of electric potential differences generated by friction between a shaft and a bearing or inside a bearing (i.e. ball bearing). The main parts of the system are the Slip Ring Transmitter, the Evaluator and optional the specially designed Data_Log software.

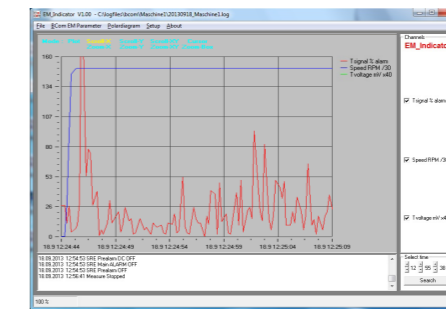
Examples of measured starts (asynchronous motor with functional ball bearing)



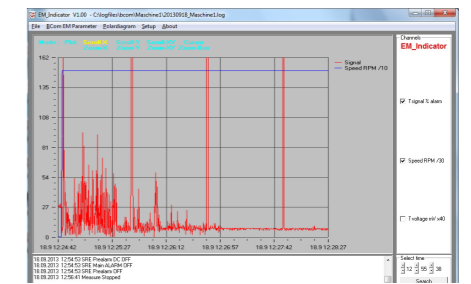
Ramped start



4 minutes after ramped start

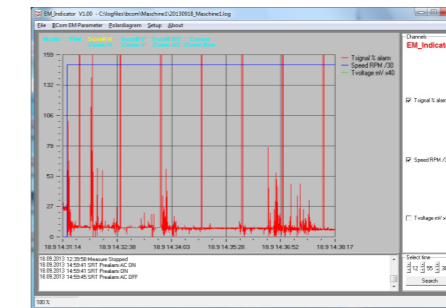


Quick start

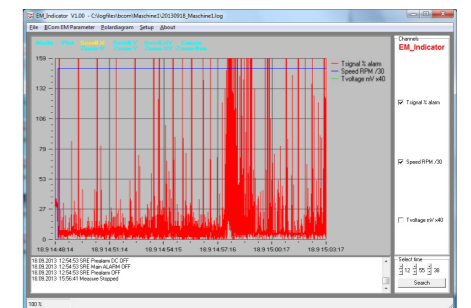


4 minutes after quick start

(asynchronous motor with damaged ball bearing)



Start with damaged ball bearing without load



Start with damaged ball bearing and load

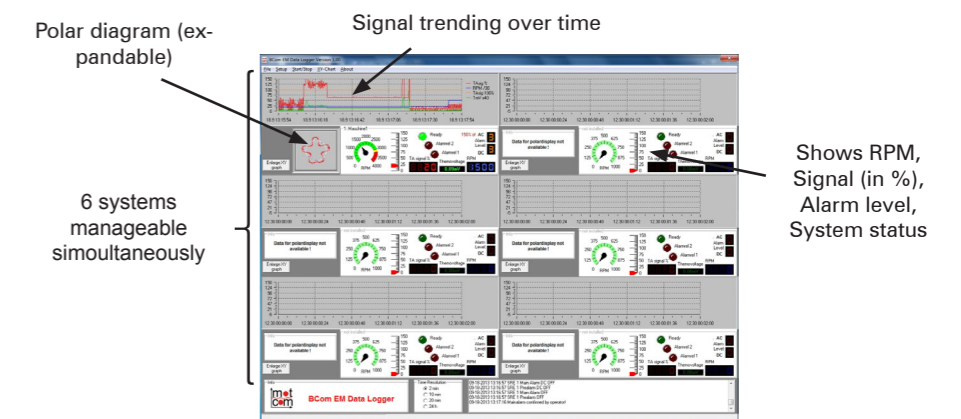


One ball partly flattened

The outer ring has been milled at one position

DATA LOGGER SOFTWARE

The Data_Log software can receive measurement data of up to six connected BeCOMS EM systems simultaneously. It is used to display and store the data for later analysis. The Data_Log software supports the localization of wow and flutter. This is done by additionally analysing the signal against the position of the incremental encoder inside the SRT. The result is the "Polar Diagram" of the Data_Log software. It shows the measured signal over the engine rotation and the angle acceleration of the shaft.



Logger software for online and continuous monitoring