



# Inspector™ Application note

Using INSPECTOR™ For Motor Electrical Analysis

Continuous Motor Insight Without Mechanical Sensors



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## Continuous Motor Insight Without Mechanical Sensors

Electric motors are the backbone of industrial operations, driving pumps, fans, compressors, conveyors, and production equipment. Despite their critical role, most motors operate with limited visibility into actual load, performance, and operating condition.

Using INSPECTOR™, Motor Electrical Analysis provides continuous insight into motor behavior using electrical measurements only, eliminating the need for mechanical sensors while delivering actionable performance and condition information.

### A Smarter Alternative to Traditional Motor Monitoring

**Conventional motor monitoring often relies on:**

- Shaft encoders
- Vibration probes
- Torque sensors
- Periodic offline testing

These methods increase cost, complexity, and maintenance effort, and are often impractical for large motor fleets.

**INSPECTOR™ enables motor electrical analysis that is:**

- Non-intrusive
- Suitable for existing installations
- Cost-effective
- Continuous during real operation

This approach reveals how the motor is operating, not just whether it is running.

### What INSPECTOR™ Monitors

**INSPECTOR™ continuously monitors and derives key motor performance indicators from electrical signals, including:**

- Motor speed
- Electrical input power
- Estimated shaft torque
- Motor efficiency
- Phase current balance
- Slip relative to synchronous speed
- Estimated mechanical output power
- Load factor
- Power factor

This monitoring scope provides a clear picture of motor utilization, performance, and operating margin.

### Speed and Load Visibility

**Understanding motor speed and load is essential for both reliability and energy efficiency.**

**Using INSPECTOR™, operators gain:**

- Continuous motor speed estimation
- Identification of abnormal operating points
- Slip-based load indication
- Visibility into lightly loaded or overloaded conditions

**This helps distinguish between:**

- Electrical supply issues
- Process-driven variations
- Mechanical load changes

## Efficiency and Energy Performance Insight

Many motors operate far from their optimal efficiency point due to oversizing, process changes, or mechanical degradation.

**INSPECTOR™ enables:**

- Continuous motor efficiency estimation
- Identification of inefficient operating regimes
- Load factor tracking over time
- Support for motor right-sizing initiatives

This transforms motors from black boxes into measurable energy assets.

## Early Indicators of Motor Condition

Electrical behavior provides early warning signs of developing motor issues.

**INSPECTOR™ continuously monitors for:**

- Overload and underload conditions
- Abnormal current behavior
- Deviation from established performance baselines
- Phase imbalance
- Low power factor

These indicators often appear before mechanical failure, enabling proactive maintenance.

## Motor Event Detection Using INSPECTOR™

**INSPECTOR™ automatically detects and records key motor-related events, including:**

- Motor overload and underload
- Stall and locked-rotor conditions
- Phase imbalance
- Motor start, stop, and inrush behavior
- Sustained low power factor
- Efficiency degradation relative to baseline

Each event is captured with contextual information to support troubleshooting and maintenance decisions.

## Application Value Using INSPECTOR™

**By using INSPECTOR™ for Motor Electrical Analysis, users benefit from:**

- Continuous, non-intrusive motor monitoring
- Improved visibility into load and performance
- Early fault detection and reduced unplanned downtime
- Data-driven maintenance and energy optimization
- Scalable monitoring across large motor fleets



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