Motor condition monitoring devices | K6CM Series

Stay alert to signs of motor failure with round-the-clock monitoring

- Monitor all types of critical motor failures and detect abnormalities early
- Monitor up to 10 motors remotely using the included PC monitoring software
- Prioritize maintenance inspections
Reduce the amount of required manual inspections
K6CM informs you when your motor needs

[Problems]

It is difficult to identify multiple failure modes of motors.

Conventional motor condition checks have multiple check items, requiring a skilled maintenance engineer to determine the appropriate maintenance timing. When multiple motors are in use, this process becomes even more time-consuming.

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Vibration</th>
<th>Heat generation</th>
<th>Decreased electrical resistance</th>
<th>Overcurrent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bearing wear</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Insulation degradation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overload</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Open phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example of patrol inspection items
Continuous motor monitoring that alerts maintenance engineers of potential issues with the motor.

The K6CM consistently monitors motor conditions by observing the motor's current waveform, a process known as comprehensive current diagnosis. The device's threshold setting makes it possible to effectively time maintenance needs without relying on an engineer.

What is comprehensive current diagnosis?

When an abnormality occurs in the load such as bearing, rotary shaft, or reducer, the motor does not rotate smoothly and a distortion occurs in its current waveform. K6CM measures its distortion as a degradation level.

With a factory floor signal light

With an office PC

With the accessory software "Motor Condition Monitoring Tool", you can monitor motor conditions remotely.

* The screen is a sample image.

Monitors the 3-phase induction motor which is the driving force of every facility.
Easy setup!
To perform monitoring, simply clamp the CT to the power line connected to the three-phase induction motor.

Motor Condition Monitoring Device Lineup

Comprehensively monitors motor and load abnormalities through current analysis

K6CM-CIM

Comprehensive current diagnosis type

Alarm bar display
- Green : Status normal
- Yellow : Failure warning
- Red : Failure critical

Display
- [PV] : Present value
- [MIN] : Minimum value
- [MAX] : Maximum value

Switches the units of the measured value displayed
- [CIM] : Degradation level
- [A] : Current

Note. Applicable motor type: three-phase induction motor

Detects abnormalities of three-phase induction motors
When an abnormality occurs in a three-phase induction motor, a change occurs in the "stator" and "rotor" of the motor, which affects the current waveform. Comprehensive current diagnosis makes it possible to capture condition changes by comparing the normal current waveform (ideal sine wave) and abnormal current waveform.

Also detects load abnormalities
When a load abnormality occurs, the current waveform of the motor changes, which allows the load abnormality to be detected.
Monitors bearing abnormalities through vibration and temperature analysis

K6CM-VBM
Vibration & temperature monitoring type

Detects abnormalities in bearings
By constantly monitoring for vibrations, the K6CM can detect early signs of bearing wear and alert the maintenance engineer before severe damage occurs.

Constantly monitors temperature
The surface temperature of the routinely inspected motor can be measured at the same time as vibrations.

Pre-amplifier and Vibration & temperature sensor
K6CM-VBS

Constantly monitors the insulation resistance

K6CM-ISM
Insulation resistance monitoring type

Measures insulation resistance
With conventional products, measurement with a Megger Tester was necessary to check for insulation degradation. K6CM-ISM can be used to perform this inspection during operation, making it possible to constantly monitor degradation trends while reducing the burden on the maintenance personnel.

Measures insulation resistance on secondary side of inverter
The “insulation resistance” of the motor can be measured even if an inverter is used.
Features  Three functions for monitoring motor condition

1  Visual inspection through alarm bar display and two-step output

Alarm bar and output function
The K6CM series is equipped with an alarm bar display on the front of the product. The condition of motor is displayed by color-coding as green, yellow, or red. This shows the degree of abnormality and is helpful for visual inspection near the motor. "Failure warning" and "failure critical" statuses are output accordingly.

2  Monitors stable values even when load fluctuates

Trigger input function
The K6CM is equipped with a trigger input function that determines the measurement timing according to the motor operation in order to accurately diagnose the condition of motors that are repeatedly started and stopped. The motor condition is determined from the operation signals (auxiliary output of the contactor and the PLC control signal), and measurement is only performed when the motor operation is stabilized, enabling fixed point observation on a daily or monthly basis under the same conditions.

3  Self-diagnosis function that improves system reliability

Self-diagnosis function
When constantly monitoring for a long period of time, unexpected failures and other problems of measuring devices must be taken into consideration. The K6CM series is equipped with a self-diagnosis function as standard. The reliability of the system is improved by monitoring the service life of the device to be measured.

Our shared Value Design for Panel (herein after referred to as Value Design) concept for the specifications of products used in control panels will create new value for our customers’ control panels. Combining multiple products that share the Value Design concept will further increase the value provided to control panels.
Motor Condition Monitoring Tool

The Motor Condition Monitoring Tool software for setting and monitoring is directly linked to the K6CM. Both allow the motor condition to be monitored visually with green, yellow, and red color-coding.

Motor condition list display

The conditions of up to 10 motors are displayed as a list through the K6CM series connected to the network. The data of up to 30 K6CM units can be viewed. (Three types of K6CM can be installed to one motor)

Displays condition list at same time as device displays

Error history display

Displays the alarm statuses of multiple motors. Allows changes in the motor condition to be checked as a time series.

Trend graph display

Allows the measured value trends to be checked on graphs.

Initial setting

Initial settings of the K6CM series such as trigger input settings, motor information registration, network settings, and threshold adjustment can be made from a PC.

Data can be output as a CSV file

Measured and accumulated data can be output in CSV format. This is useful for creating reports and statistical materials.
Degradation progress/failure mode correspondence table

After installing a three-phase induction motor, performing proper maintenance by monitoring the motor condition will prolong its service life. Please select the optimal model for the type of abnormality you want to detect.

### Degradation progress/failure mode correspondence table

<table>
<thead>
<tr>
<th>Failure mode</th>
<th>Setup period</th>
<th>Operation period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inside the motor</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation degradation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Outside the motor</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bearing abnormality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abnormality of rotary shaft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>· Rotor/stator abnormality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abnormality of rotary shaft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>· Imbalance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>· Misalignment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load abnormality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>· Cavitation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>· Device abnormality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>· Overload</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**K6CM-VBM** (Vibration & temperature monitoring type) [Velocity]

**K6CM-CIM** (Comprehensive current diagnosis type) [Degradation level]

**K6CM-ISM** (Insulation resistance monitoring type) [Insulation degradation]

**K6CM-VBM** (Vibration & temperature monitoring type) [Velocity/Acceleration]

**K6CM-CIM** (Comprehensive current diagnosis type) [Overcurrent]

Faulty installation
Faulty centering etc.
Faulty mounting
Faulty operating condition
Faulty load part

After installing a three-phase induction motor, performing proper maintenance by monitoring the motor condition will prolong its service life. Please select the optimal model for the type of abnormality you want to detect.
The condition of three-phase induction motors changes due to aging degradation. Detecting these changes allows you to monitor for abnormalities.

**Motor and load condition**

<table>
<thead>
<tr>
<th>Degradation progress period</th>
<th>Breakdown period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Insulation degradation</strong></td>
<td><strong>Insulation breakdown</strong></td>
</tr>
<tr>
<td><img src="image" alt="K6CM-ISM" /> (Insulation resistance monitoring type) [Insulation degradation]</td>
<td></td>
</tr>
<tr>
<td><strong>Bearing damage</strong></td>
<td><strong>Bearing breakdown</strong></td>
</tr>
<tr>
<td><img src="image" alt="K6CM-CIM" /> (Comprehensive current diagnosis type) [Degradation level]</td>
<td></td>
</tr>
<tr>
<td><strong>Degradation progress of motor</strong></td>
<td></td>
</tr>
<tr>
<td>[Degradation level]</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="K6CM-VBM" /> (Vibration &amp; temperature monitoring type) [Velocity/Acceleration]</td>
<td></td>
</tr>
<tr>
<td><strong>Degradation progress of load</strong></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="K6CM-VBM" /> (Vibration &amp; temperature monitoring type) [Velocity]</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="K6CM-VBM" /> (Vibration &amp; temperature monitoring type) [Temperature]</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="K6CM-CIM" /> (Comprehensive current diagnosis type) [Overcurrent]</td>
<td></td>
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**New product**

**Aging degradation**

**Service life**
Controllers & I/O
- Machine Automation Controllers (MAC) • Motion Controllers
- Programmable Logic Controllers (PLC) • Temperature Controllers • Remote I/O

Robotics
- Industrial Robots • Mobile Robots

Operator Interfaces
- Human Machine Interface (HMI)

Motion & Drives
- Machine Automation Controllers (MAC) • Motion Controllers • Servo Systems
- Frequency Inverters

Vision, Measurement & Identification
- Vision Sensors & Systems • Measurement Sensors • Auto Identification Systems

Sensing
- Photoelectric Sensors • Fiber-Optic Sensors • Proximity Sensors
- Rotary Encoders • Ultrasonic Sensors

Safety
- Safety Light Curtains • Safety Laser Scanners • Programmable Safety Systems
- Safety Mats and Edges • Safety Door Switches • Emergency Stop Devices
- Safety Switches & Operator Controls • Safety Monitoring/Force-guided Relays

Control Components
- Power Supplies • Timers • Counters • Programmable Relays
- Digital Panel Meters • Monitoring Products

Switches & Relays
- Limit Switches • Pushbutton Switches • Electromechanical Relays
- Solid State Relays

Software
- Programming & Configuration • Runtime