

Application Note

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**Harmonics and Voltage Dip Analysis of Induction
Motor using Power Network Meter – ND45**



Overview

Induction motors are major load contributors and are also called the work horses of industries. Health of induction motors, its operational efficiency and performance is constantly monitored. Failure of these equipments due to variation in supply parameters leads to a huge loss in both production and revenue, in addition, long shutdowns may also occur. Therefore, industries have made it a general practice to test this equipment periodically and take corrective actions proactively.

Problem Statement

Critical motors which are linked to the Turbo Compressor run 24×7. There is a continuous stress on winding caused due to Harmonics and Voltage Dips, reason being unequal loading on Turbo Compressor. This results in increased heating of the induction motor which may further lead to breakdown of these critical motors.

Solution

It is crucial that the physical as well as electrical parameters of these critical motors are monitored continuously. Increased heating due to iron and copper losses at the harmonic frequencies causes stress on the winding of the motor. As a number of motors are connected in line, the switching of motors results in change in behavior of harmonics. For example, Motor 'A' is ON and runs for a particular time. Due to uneven loading, harmonics are generated in Motor 'A'. Further as we switch on Motor 'B' in parallel, it will also draw harmonic current. However, due to this switching, Motor 'A' will draw even more harmonic current compared to previously.

ND45 – A power network recorder is an advanced multifunction instrument, which can measure various electrical parameters along with harmonics (51st) and is capable of monitoring temperature of equipments/ devices. Users can connect 2x temperature inputs to it which will help them get a comprehensive solution to monitoring electrical parameters as well as device temperature. Temperature monitoring is essential so as to understand the heating and cooling curve of the winding and body of the equipment.

With this solution, the user is able to monitor the voltage dips event, harmonic level and the temperature of the critical motor without interrupting its operation. Users can log this file to record the various power quality events. The status can be viewed on the device software Power Vis or any other customer software integrated with it.



The figure above shows a possible set-up to monitor the motor parameters using ND45. As depicted, the user can set alarm output to indicate the fault event. Also, with the available interfaces, user-friendly monitoring of the parameters can be achieved.

Other Applications

- Substation feeder monitoring
- Logging of energy counted by other meters, for example, flow meter, gas meter, water meter or energy meter; can be done
- Building Management System

Benefits

- This solution facilitates continuous monitoring of induction motor temperature
- Communication over various available interfaces enhances system automation and reliability
- User-settable output serves as a warning or cautionary signal for the given inputs
- True visualization of Load current graph

Featured Product

ND45-Power Network Meter

**Available Features**

- Measurement and recording of over 500 electric energy quality parameters acc. to EN 50160, EN 61000-4-30 standards Class A/S
- Analysis of current and voltage harmonics and inter harmonics up to 51st for class I.
- Flicker
- 4-quadrant energy measurement in 4 tariffs
- Monitoring up to 6 additional energy meters with pulse output
- Recording measurements before and after events (dips and swells)
- Configurable archives of actual values and events recording.
- Data archiving on an SD card – memory up to 32 GB.
- E-mail messages in case of alarm occurs,
- Color touch screen: LCD TFT 5.6", 640 x 480 pixels
- Automatic synchronization of RTC clock with the NTP time server



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