An Efficient Method for Motor Protection System Control Using Labview

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ABSTRACT

The need for a motor protection system can be well understood by the fact that motors are integral device in any of the present day industries. Malfunctioning or any other faults in motor can halt the functioning of such industries. This can cause huge financial losses. So an efficient motor protection system is necessary. The present research work deals with the application of Labview for motor protection system, which can constantly monitor and control, a large motor system. This paper presents a highly reliable approach towards protection of commonly used motors. Here we deal with different kinds of motor faults and detection of all these faults using NI LABVIEW™. The present paper will not only be helpful for industrial purposes but it can also be helpful for students to understand motor fault detection. The LABVIEW has been successfully applied to make an efficient motor protection system.

Keywords: 1-Phase Induction Motor, Current Transformer, NI DAQ (9219), NI Elvis II, NI LABVIEW™, Transformer (6-0-6)

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1. INTRODUCTION

Motors are one of the most essential devices in most industries. It is very important to ensure their smooth operation by preventing them from various faults that may creep in causing them to shut down. The unexpected shutting down of a motor can cause huge economic losses. It also leads to large energy losses. So it is necessary to have a protection system for such motors. In addition to protection of the motor against different faults, this protection system also displays the type of fault that is occurring.

The use of protection devices in power systems is absolutely necessary in order to safeguard them against short circuits, overloads and, in general, abnormal operations, or faults. The protection system in generating units is especially important since it must reliably guarantee the power supply. As per statistics, we have seen that annual failure rate of motor is estimated at 3-5% and upto 12% in extreme cases.

The most common types of faults occurring in ac motors are:

1. Stator fault
2. Rotor fault

Performance of motor can be affected by following type of faults:

- Electrically related faults
- Mechanically related faults
- Environmentally related faults

Out of these, the faults that are most frequently occurring in motors are electrically related faults. The common types of such faults are overvoltage, under-voltage, open-phase, over-current, unbalanced voltage etc. Owing to the thermal, electrical and mechanical stresses, mechanical and electrical failures are unavoidable in induction motors. Early detection of abnormalities in the motor will help to avoid expensive failures.

In the previously devised systems, the delay times are altered constantly without keeping in mind the fault level. The delay times must be set optimally for a hassle-free operation. In case temporary faults are detected in the system, halting the motor operation without waiting result in disruption of production lines. If the system takes a long time to stop in case of occurrence of a fault, it might damage the entire system.

The LABVIEW is also extremely useful as an automated tool for model calibration and validation especially for modern computational multi-agent large-scale social-networks systems that are becoming heavily used in modeling and simulation of complex social network.

2. PROBLEM DEFINITION

The proper functioning of a motor is that it occurs efficiently without facing faults. In the present paper, an attempt has been taken to achieve the protection against overvoltage, under voltage, over current, open phase and over temperature for a motor. LABVIEW has been applied to design a motor protection system. The developed model has been validated with another set of confirmation experiments.
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