Fault diagnosis tool for circuit breaker wiring harness

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ABSTRACT

A new concept of fault diagnosis is based on measuring the contact resistances of the individual contacts of the internal circuits of the high voltage circuit breaker by using the IOT based circuit. In this equipment, we measure the resistances of the NO and the NC contact by using the voltage and current sensor, Arduino kit. In this Arduino kit we are programmed such that the sensor senses the value of the voltage and current it goes to the Arduino kit and pre-insert value of the resistance formula in a programmed and according to the value resistance we will get the condition healthy or unhealthy and also we get the resistance values of the contact for the preventive maintenance.

Keywords — Microcontroller (Arduino kit), NO and NC contact, Voltage supply current sensor, Voltage sensor, High voltage circuit breaker display

1. INTRODUCTION

An electrical circuit breaker is a switching device which can be operated manually and automatically for controlling and protection of electrical power system respectively. As the modern power system deals with huge currents, the special attention should be given during designing of a circuit breaker for safe interruption of the arc produced during the operation of the circuit breaker. This was the basic definition of a circuit breaker.

In s6 circuit breaker, sulphur hexafluoride gas is used as the arc quenching medium the contact of the circuit breaker are opened in a high-pressure flow sulphur hexafluoride s6 gas ad an arc is struck between them. The gas captures the conducting free electrons in the arc to form relatively immobile negative gas. This type of circuit breaker installed in substation. Sometimes fault occurred. This fault finds as per as in minimum time the wiring harness tool required.

Fig. 1: Circuit diagram

The modern power system deals with huge power network and huge numbers of associated electrical equipment. During short circuit fault or any other types of electrical fault, this equipment as well as the power network suffer high stress of fault current in them which may damage the equipment and networks permanently. For saving these pieces of equipment and the power networks, the fault current should be cleared from the system as quickly as possible. Again after the fault is removed, the system must come to its normal working condition as soon as possible for supplying reliable quality power to the receiving ends. In addition to that for
2. NO CONTACT OR NC CONTACT

NO is normally open i.e. the contacts are normally open and close when the switch is actuated. NC is normally closed i.e. the contacts are normally closed and open when the switch is actuated. 1NO1NC is generally used to describe contactors (industrial power relays) and manual switches like emergency stop Button.

An open contact is a term used in dentistry to describe the space between adjacent teeth when the teeth are neither touching nor a sufficient distance from each other to potentially allow space to naturally remain free of debris.

The “normally open” switching function is widely used in industrial applications since it enables direct control of a safety or control function. When a pressure switch with “normally open” function detects that a critical pressure value has been reached, i.e. the limit value has been exceeded, then the switch completes a circuit. If one has (for example) a safety system, such as an emergency stop system or an alarm klaxon, connected in series with the switch, then this will then be energized and, with this, activated directly – effectively “switched on”. Thus a pressure switch with a “normally open” function fulfills direct control functions when the pressure exceeds or falls below the critical value.

3. COMPONENT

3.1 ARDUINO

Arduino is an open-source hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), [1] permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or as Do-It-Yourself (DIY) kits.

3.2 LM317

The LM317 is an adjustable 3-terminal positive voltage regulator capable of supplying in excess of 1.5A over an output voltage range of 1.2 V to 37 V. The LM317 serves a wide variety of applications including local, on card regulation. LM317 is a positive voltage regulator with three different terminals Adjust, Vout and Vin respectively. It can supply the output voltage in a range of 1.25-37V and a current more than 1.5A. It has advanced line regulation and load regulation standards as compared to the general regulators. It has a lot of applications in real life e.g. motor controllers, power bank solutions, hydraulic valve, Ethernet switch, battery chargers etc.

3.3 Resistors

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat, may be used as part of motor controls, in power distribution systems, or as test loads for generators. Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (such as volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity.

3.4 Display

In a circuit breaker, there is a most use of NO and NC contact, there is a fault occurs on the circuit breaker damage the contact of the circuit breaker. Indirectly changing the resistance of contact and that’s why we required a display to show the value of resistance.

We used display because of whenever fault occurred in a substation, in that case, the value of NO and NC contacts resistance get changed. So that’s why the change resistance value shows purpose we use this display.

4. SOFTWARE PROGRAMMING

The board is equipped with sets of digital and analogue input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution-Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards and the reference model for the Arduino platform. The ATmega328 on the Arduino Uno comes preprogrammed with a boot loader that allows uploading new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. The Uno also differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.
5. CONCLUSION

Hence conclude from this paper using fault diagnosis tool for circuit breaker wiring harness get less consumption of time and then tool operate purpose not required a skilled person and easily operate this tool. In future, this is the most important tool because save more time according to a fast or digital word.