RESEARCH ON ONLINE TEMPERATURE MONITORING METHOD FOR CABLE CONNECTOR

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ABSTRACT

When the contact of cable connections is imperfect and the current flow through it is large, the internal temperature will rise and the ageing rate of the isolation material will be accelerated; this will severely affect the normal operation of switch panels. This paper focuses on the online temperature monitoring methods for cable connections. A feasible temperature monitoring scheme based on magnetic induction and wireless commutation is proposed. The design and control methods of the power supply unit in the scheme are analyzed. In the last part of the paper, experiment results are presented and discussed. .

KEYWORDS

Cable Connector, Temperature measuring, Wireless communication, Online monitoring.

INTRODUCTION

Cable connector is an important part in the power deliver system. In a power system, if a cable connector isn't well connected, the resistance at contact point will rise; the temperature at the point will rise gradually; very high temperature has adverse impact on the insulating and shielding structure[1~3]. The ageing rate of the isolation material will also be accelerated.

It's important to develop an embedded electronic unit for cable connector to continuously watch on the temperature variation of the temperature at connecting points. In order to develop an engineering feasible temperature monitoring unit, three important aspects should be taken into consideration. First, since the points need to be measured are in the primary circuit with high voltage, electrical isolation is crucial so as to safely get the actual temperature with accuracy.. Second, the structure and installation of measuring unit must be carefully designed, it must have no adverse impact on the primary circuit and isolation material, it should have no additional temperature rise, it will not induce partial discharge.

In recent years, different schemes are developed to monitoring the temperature rise of the primary circuit. These units are placed on the contacts of circuit breakers, busbars or in bushes. All of the schemes are based on three kinds of principles, i.e., infrared contactless temperature monitoring[4~7], optical fiber based temperature measuring methods[8], temperature measuring methods with floating power on the primary side and wireless communication. Infrared based method is safe and accurate, however, it can't measure some points in a complex structure if these points are covered or shielded. Fiber based methods are expensive and they decreased the creep distance. Wireless communication based schemes are implemented by developing an electronic unit to directly measuring the temperature on the high voltage side. To make such a device work properly, design of the power system is delicate. Of all the solutions reported so far, the principle of the power system is formed with a CT and control unit; when primary current flows through the CT, voltage is got on terminals of the coil of CT. Since the primary current is unstable and it varies in a very large range, a control unit is designed so as to get stable 5V or 3.3V power source.

BASIC CONFIGURATION OF TEMPERATURE MONITORING SCHEME

In order to continuously monitor the temperature at the contact point in a cable connector, the structure of cable connector is redesigned as shown in Fig.1.

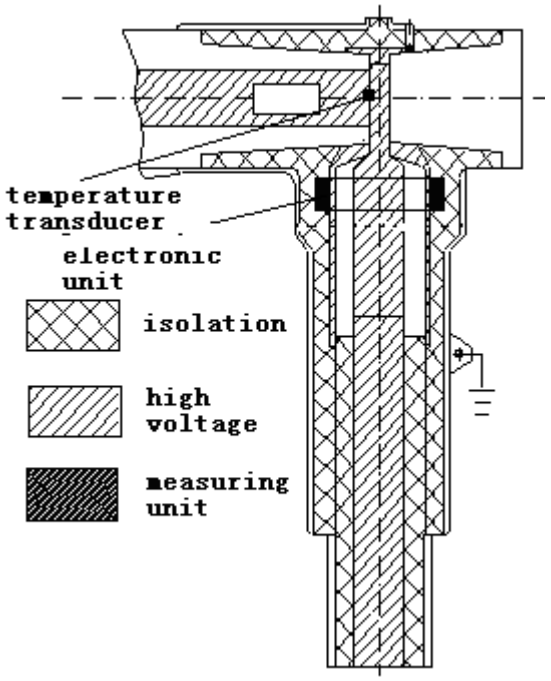

Fig.1. Structure of cable connector

In the new structure, we have placed an electronic unit that consists of a coil and a set of tiny electronic boards inside the connector.. The principle is based on electromagnetic induction and wireless communication. The electromagnetic induction unit [9, 10] supplies stable power for a single chip system and a 2.4G wireless communication unit. The single chip system periodically measures the temperature