

# 발전기 정지중 진단을 위하여 개발된 유도결합 마그네틱 프로브의 성능특성

## Performance Characteristics of an Inductively Coupled Magnetic Probe Developed for Off-line Monitoring of a Rotating Machine

박노준, 양상현, 공태식\*, 김희동\*, 박대희†

Noh-Joon Park, Sang-Hyun Yang, Tae-Sik Kong\*, Hee-Dong Kim\*, Dae-Hee Park†

\*전력연구원, 원광대학교

\*KEPRI, Wonkwang University

**Abstract :** In order to detect exact corona discharge point at stator winding of a rotating machine, an inductively coupled magnetic probe has been developed, which consists of U-shaped and truncated manganese ferrite inductor as a helix. The measured current intensity is somewhat higher than commercially developed probe. It has been shown that the measured intensity of proposed probe is suitable for manual localization as to off-line stator winding monitoring of rotating machine.

**Key Words :** Magnetic probe, Manganese ferrite, PD, Off-line monitoring, Rotating machine, Localization

### 1. Introduction

It is necessary to develop a magnetic probe that is able to investigate the exact defect position of such stator winding in order to verify the degree of deterioration in some defects occurred at the stator winding of a rotating machine.

Therefore, this study fabricates a corona probe consist of winds wires round horseshoe shaped manganese ferrite for a prototype and then measures the current level by applying the stator winding of a 6.9kV class rotating machine that has artificial corona discharge defects after verifying the possibility of the PD signal detection at a cable joint that has artificial void defects. The magnetic probe is consist of U-shaped and truncated 11.51weight% Mn-ferrite with dielectric constant of 2,400 which is classified to  $MnFe_2O_4$ .

In addition, for confirming the performance characteristics of the probe, this study compares the detected current level with commercial EM probe in both of cable joint and dismantled stator winding environments.

### 2. Results and Discussion

The fabricated U-shaped manganese probe was designed based on inductive position sensor that detects PD signals through sensing the change in inductances caused by the current at conductors. Therefore, it can be used not only detecting the stator winding of a rotating machine but also applying it to the PD detection of power cables. Thus, a measurement system configured for applying the fabricated probe as to each case and analyzed the results of the measurement.

A dismantled stator windings of rotating machine with 11 detection points was prepared for the experiment, which is artificially defected for corona discharge by surface scratch, whereas joint box of XLPE power cables with 10 detection points was also considered.

The measurement system consists of a power supply equipment, Hipotronix 750-2CTS, that can supply the voltage of maximum 50kV to the leading end of the power cable, and

digital ammeter, while 7kV high voltage was applied for stator winding and 16kV high voltage was applied for cable joint box, respectively.

In the comparison of the measurement results of the detected current characteristics between the U-shaped manganese ferrite probe with the commercially developed probe of PPM97, the maximum current level of the U-shaped probe was 34mA at position 5, whereas PPM97 was 10mA at same position.

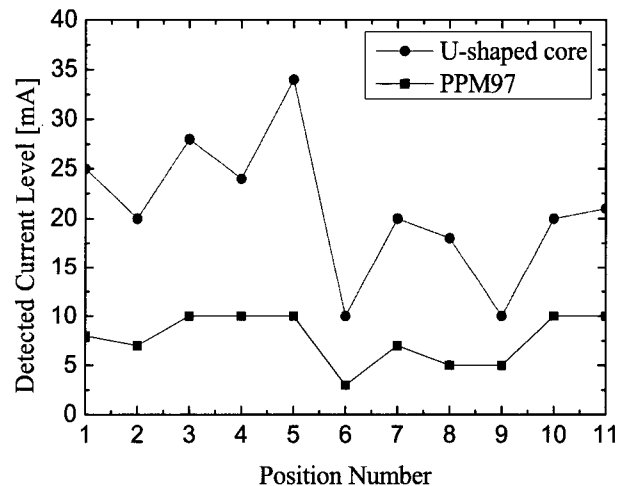


Fig. 1. Detected current level at dismantled stator windings

### Acknowledgments

This study is sponsored by KEPRI(2010T100200071) based on the support of the Electric Power Industry Technology Evaluation & Planning.

### References

- [1] IEC 60270, "High-voltage test techniques-Partial discharge measurements", pp.25-37, 2000.
- [2] IEEE Std. 1434-2000, "IEEE Trail-Use Guide to the Measurement of PD in Rotating Machinery", pp.2-29, 2000.

† 교신저자) 박대희, e-mail: parkdh@wku.ac.kr, Tel: 063-850-6349  
주소: 570-749 전북 익산시 신원동 344-2  
원광대학교 전기및정보통신공학부