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A DETECT PARTIAL DISCHARGE IN ISOLATOR USING A FLUKE ii910 SONIC INDUSTRIAL IMAGER IN PTR 03 FEEDER (SARIBU DOLOK)

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ABSTRACT

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Partial discharge is a very serious problem that should be monitored quickly. The cause of Partial discharge failure is due to the presence of voids filled with gas/air in the insulation material. Partial discharge can also be regarded as losses because it can reduce the quality of the insulation material. This study aims to detect partial discharge using the Fluke ii910 Sonic Industrial Imager. Tests in this study using descriptive quantitative research methods. From the tests that have been carried out, it can be concluded that using the Fluke ii910 Sonic Industrial Imager can make it easier to find partial discharges on the insulator and minimize the impact of interference caused by partial discharges

Keywords: Fluke ii910, Partial Discharge, Isolator

1. INTRODUCTION.

PT. PLN (Persero) which is a state company that distributes electrical energy from generation, transmission, and distribution to consumers. The distribution of electrical energy in this case PT. PLN (Persero) maintains that the distribution of electrical energy can run properly continuously without any disturbance. The mechanisms for the occurrence of failure / breakdown in the insulation are intrinsic failure, thermal failure, electromechanical failure, streamer failure and partial discharge failure. . The cause of Partial discharge failure is due to the presence of voids filled with gas/air in the insulation material. Partial discharge can also be said to be losses because it can reduce the quality of the insulation material. Partial discharge is a very serious problem that should be monitored quickly and easily. When checking the insulator, transformer, medium-voltage panel (switchgear), or high-voltage power line, we must be sure that we find the problem early on quickly. Undetected partial discharges can cause power outages, fires, explosions, or death by arcing.

The Fluke ii910 Acoustic Imager is the perfect tool for high-voltage electricians, electrical test technicians, and electrical grid maintenance teams who constantly inspect and maintain power distribution and industrial high-voltage equipment. ii910 provides a safe and fast way to detect and locate partial discharges to maintain high voltage equipment and prevent catastrophic events. With SoundSight™ technology, the ii910 translates the sound it hears into a visual representation so we can quickly spot problem areas. By using the Fluke ii910Acoustic Imager partial discharge detection in insulators will become easier, faster and safer. With this problem.

2. LITERATURE REVIEW

2.1. Previous Research.

Equipped with an array of microphones for a wider field of view, this Fluke ii910 Sonic Industrial Imager enables maintenance teams to quickly and accurately locate air, gas and vacuum leaks in compressed air systems; even in noisy environments. Specifically designed for noisy production lines, SoundSight™ Technology is easy to learn and implement. The 7" LCD touch screen displays SoundMap™ on a visual image for fast leak location identification. The clear and intuitive interface allows technicians to isolate sound frequencies from leaks to filter out loud background noise. Within hours, the team can inspect the entire plant - even in busy operations. For the first time, You can quickly and easily identify the air leak repair needed to ensure efficient operation and reduce

utility bills. Images can be saved and exported for reporting purposes. Never again take air leaks for granted.

2.2. How ii910 works review

ii910 is equipped with 64 microphones that are designed in such a way that it looks like a cluster, with a camera that seems to be the center of the cluster. Thanks to the complex algorithm it carries, this device can create a sound map or image of the sound source, then the sound map will be combined with the image. Depending on the position of the sound source based on the coverage area of the ii900/ii910, there is a slight time difference in the sound that each microphone picks up. This difference is used to detect the position of the sound source: If the sound is coming from the right side of the device, the microphone on the right of the cluster will pick up the sound a fraction of a second before the microphone on the left. Then, the ii900/ii910 will display the sound image on the right side of the screen.

Figure 1. Fluke ii910 Sonic Industrial Imager

The innovative SoundSight technology converts ultrasound into clear visuals to find partial discharges easier and faster. The user-friendly large 7” LCD touch screen display makes it easy to find partial discharges and compressed air/gas leaks, and enter notes with your finger. Find partial discharge safely up to 120 meters away The wide ultrasonic frequency detection range up to 100KHz enables you to detect partial discharges at an early stage for proactive maintenance.

2.3. Partial Discharge

Partial discharge is an electric spark discharge that occurs in a part of the insulation (in the inner cavity or on the surface) as a result of a high potential difference in the insulation. Partial Discharge is a very serious problem that you should be able to monitor quickly or easily. When inspecting insulators, transformers, medium voltage panels, or high voltage power lines, you must be sure that you find the problem early on quickly. There are generally four types of partial discharges. Each occurs for a variety of reasons and has the potential to cause varying degrees of damage. Usually, partial discharges are caused by minor damage resulting in thousands of repeated small discharges. However, this discharge can expand and enlarge over time. Eventually,

And also types of partial discharge

1. Corona Discharge: One of these forms of partial discharge occurs when a discharge radiating from a tapered part of a conductor is directly into the air. (This is what causes sound and radio frequency emission.) From a damage or safety point of view, these discharges are not very dangerous.
2. Arc Discharge: Arc discharge is a continuous electrical discharge due to electrical failure of the gas. Plasma will appear when current flows through the air or other ordinary non-conductive medium.
3. Surface Discharge: Discharge flowing along the surface of the insulation is called surface discharge—or surface discharge. This discharge is one of the most destructive types of partial

discharge. Contamination and weathering of insulating surfaces are the two most common causes of surface discharge. In medium and high voltage equipment, this type of discharge occurs when there is an insulation failure. This is generally caused by high humidity or poor maintenance. The ingress of moisture is also a common cause of the surface discharge.

4. Cavity Discharge (internal): Generally, this discharge is caused by a breakdown in solid insulation in cables, bushings, GIS terminal insulation, etc. Cavity discharges have the potential to damage insulation and will usually continue to expand until a complete electrical failure occurs.

2.4. Partial discharge detection

In general, surface slag discharge and cavity discharge are the most worrisome. Therefore, industrial high-voltage electricians, power distribution utility technicians, power transmission utility technicians, and high-voltage electricians in original equipment manufacturers (OEMs) must first detect and repair both discharges. In many cases, detecting and correcting partial discharge is a safety standard that must be done first. In addition to personal safety, serious partial discharges can cause: Job stot, Fire, Insulator performance degradation, Overload on the power grid

This problem can be avoided if we detect PD early before any damage occurs. Currently, there are several methods to detect partial discharge. Ultrasonography, radio frequency (RF), and ultra violet radiation are some of the methods that can be used to detect partial discharges. However, this method, until now, is still not perfect and has weaknesses. Some of the drawbacks of this method: Prevents detection of partial discharge behind the casing, its use requires extensive training, and lacks accuracy to ensure immediate inspection and repair is required—moreover, the user must be near potentially hazardous equipment.

2.5. Insulator

Its main function is as an electrical insulator in the conductor to other conductors and conductor to the ground. However, because the insulated conductor has a mechanical force in the form of weight and a tensile force that comes from the weight of the conductor itself, from tension and due to changes due to temperature and wind, the insulator must have the ability to withstand the mechanical loads that it must bear. For insulation against the ground, it means relying on the insulation ability between the wire and the iron rod that binds the insulator to the travers, while for the insulation between phases, the distance between one conductor and the other is to give the distance between the insulators to one another where the temperature conditions are hot to the maximum limit and the wind is strong. blow no matter how hard the two conductors will not touch each other.

The insulating material for SUTM is porcelain/ceramic coated with glazing and glass, but most of it is made of porcelain rather than glass, because the air has high humidity in general in Indonesia, insulators from glass are easy to stick with dew on the surface. The color of the insulator is generally brown for porcelain and clear-green for glass. Insulator construction is generally made with indentations that aim to extend the propagation distance, so that in rainy conditions there are parts of the surface of the insulator that are not attached to rainwater. Based on the load carried, the insulator is divided into 2 types, namely:

3. METHODS

This research is a case study on the Use of Fluke ii910 Sonic Industrial Imager to Detect Partial Discharge in Insulators. Data collection techniques in this study were carried out with documentation to obtain secondary data, as well as field testing. The documentation in question is in the form of collecting written and objective data owned by PT PLN (Persero) which contains reports of inspection results for the last few months. Inspectors go directly to the field/scene following, witnessing, and observe directly the inspection process in the field. This research uses a descriptive quantitative research method. The purpose of this descriptive quantitative research is to make a description, picture, or painting in a systematic, factual, and accurate manner. The author makes a research stage that is used as a research flow. Here are the steps that the researchers took:

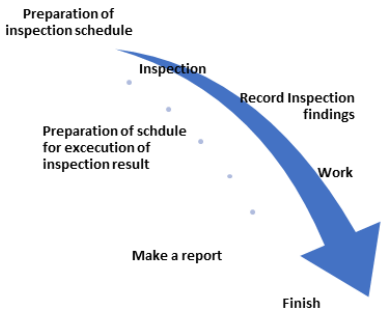


Figure 2. Research flow chart diagram

4. RESULTS AND DISCUSSION

4.1. Inspection

This inspection is carried out on feeder PTR 03 (Saribu Dolok) in an online or live state. Inspection is carried out by pointing the Fluke ii910 Sonic Industrial Imager at the Isolator which aims to see the Partial Discharge in the insulator displayed on the Fluke ii910 Sonic Industrial Imager. After checking using the Fluke ii910 Sonic Industrial Image, the next step is to prepare a schedule for the execution of the inspection results. The following table provides data on the results of the inspection/inspection of the Isolator on the HUTM (Medium Voltage Air Delivery) network using the Fluke ii910 Sonic Industrial Imager. can be seen in table 1.

Table1. Inspection data using the Fluke ii910

NO	FEEDER	LOCATION	DATE	INSPECTION FINDING	DOCUMENTATION
1	PTR 03	LAT CINGKES-TAMBAK BAWANG AND UJUNG BAWANG	09/02/2021	Suspension Insulator Flashover	
2	PTR 03	LAT CINGKES-TAMBAK BAWANG AND UJUNG BAWANG	09/02/2021	Suspension Insulator Flashover	
3	PTR 03	SUB LAT SARIBU JANDI	09/02/2021	Suspension Insulator Flashover	

4.2. Schedule Of Execution Of Inspection Results

The following table is the execution plan data. The results of the inspection/inspection of the isolator using the Fluke ii910 Sonic Industrial Imager on the HUTM network (Medium Voltage Air Delivery can be seen in tables 2.

Table2. Inspection execution plan data

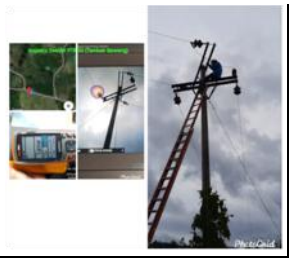
NO	FEEDER	JOB DESCRIPTION	LOCATION	DATE	START	FINISH	OPEN (GI/GH/SECTION)	REASON FOR REPLACEMENT
1	PTR 03	Replacement For Suspension Insulator Flashover	Lat Cingkes-Tambak Bawang and Ujung Bawang	11/02/2021	12:30 PM	2:30 PM	Section (Lat Cingkes)	May cause disturbance
2	PTR 03	Replacement For Suspension Insulator Flashover	Sub Lat Saribu Jandi	11/02/2021	12:30 PM	2:30 PM	Section (Lat Cingkes)	May cause disturbance

4.3.Report Of Working Results

The following table is a data report on the results of the inspection/inspection of the Insulator using the Fluke ii910 Sonic Industrial Imager on the HUTM network (Medium Voltage Air Delivery can be seen in tables 3.

Table 3. Work Report Data Inspection/Inspection Results

NO	FEEDER	LOCATION	WORK DATE	INSPECTION FINDING	DOCUMENTATION
1	PTR 03	LAT CINGKES-TAMBAK BAWANG AND UJUNG BAWANG	11/02/2021	Suspension Insulator Flashover	
2	PTR 03	LAT CINGKES-TAMBAK BAWANG AND UJUNG BAWANG	11/02/2021	Suspension Insulator Flashover	

3	PTR 03	SUB LAT SARIBU JANDI	11/02/2021	Suspension Insulator Flashover	

5. CONCLUSION

With Fluke ii910, we can find the partial discharge of the insulator safely remotely and when the network is under voltage.Fluke ii910can detect in real time the partial discharge of the insulator displayed on the Fluke ii910 screen.

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