Journal of Science Technology (JoSTec)
Published by: Inovasi Pratama Internasional. Ltd
Journal homepage: https://ejournal.ipinternasional.com/index.php/jostec
DOI: https://doi.org/10.55299/jostec.v3i3.97-101

Performance Analysis of Protection System on A 20 KV Distribution System Network at PT PLN Tutorial Shop Pematang Siantar City

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ARTICLE INFO

Article history:

Received November 14, 2021
Revised November 24, 2021
Accepted December 14, 2021

Keywords:

Protection System, A 20 KV, System Network

ABSTRACT

On era of globalization needs of electrical energy very high . In distribution of electrical energy expected could walk with good without existence interference. Distribution of electrical energy from generator until distribution to consumer expected could walk with good . In another side also often occur disturbance specifically on the distribution system power electricity . System distribution power electricity that uses cable air or cable soil often experience various interference . Frequent disturbances _ occur is disturbance symmetry or disturbance not the symmetry that can in the form of connection short one phase to land , between phase or break up wrong one or more . For knowing big current disturbance the required analysis system distribution transformer for knowing disturbances that will happen . Security setting design on network proper distribution is something effort protect equipment, system as well as needs consumer from possible disturbance occur in system distribution. Calculation current disturbance and big transformer nominal current will used as reference important in determination of transformer settings in deployment voltage to consumers.

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1. INTRODUCTION

Electricity have very role important and strategic for life , by because that in the provider must Fulfill aspect reliable and safe.Size reliability something system could is known from how much often system experience off, how long does it take to go out occur and how much fast time needed for restore condition from extinguished. System Power Electricity consist from several sub- systems, namely Generation, Transmission, and Distribution. Power electricity distributed to Public through network distribution . Network distribution is part network electricity the closest with society . Network distribution grouped Becomes two , namely network primary distribution and network distribution secondary. Voltage The primary distribution used by PLN is 20 kV, 12 kV, 6 kV. On moment this, voltage predisposed primary distribution developed by PLN is 20 kV. Voltage on network primary distribution is derived by substation distribution Becomes voltage big low is 380/220 V, and distributed return through network voltage low to consumer. On operation system power electricity often occur disturbances that can result in the disturbance distribution power electricity to consumer . Disturbance is barrier from something medium system operate or something state from system distribution power distorted electricity from normal conditions. Something

disturbance inside equipment electricity defined as happening something damage inside network electricity that spreads Genre current electricity go out from the right channel . System distribution power electricity up to distribution like shown on picture below this

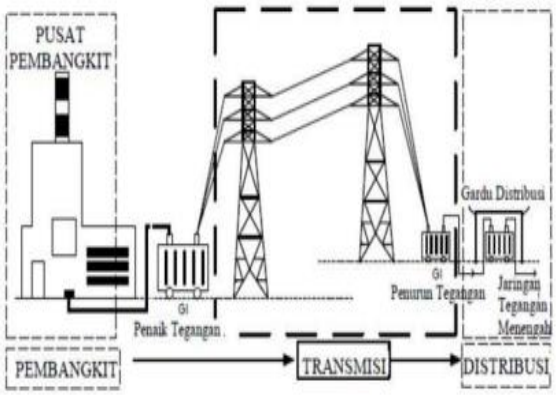

Figure 1. System distribution power electricity

A. Feeder 20 kv

Feeder is part of the distribution of electricity from the substation to reach consumers. One of the causes of blackouts is caused by disturbances in the 20 kv feeder.

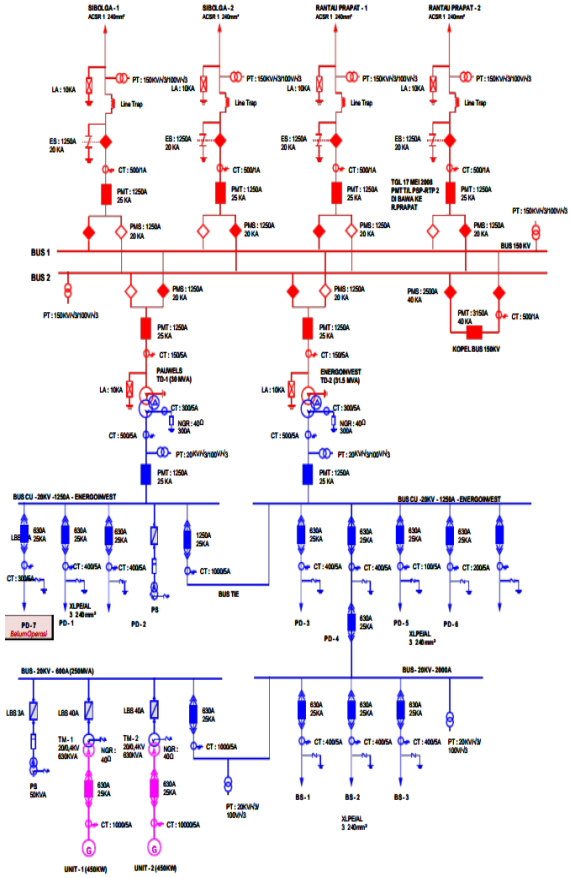

Figure 2. Picture of single line diagram of UPT Pematang Siantar

If there is interference in the feeder it usually takes quite a long time to fix it. So it is expected that interference in the feeder is avoided so that the distribution of electrical energy can be carried out continuously.

B. Electric Power Distribution System

The electric power distribution system is one part of an electric power system that starts from incoming PMT at the substation to the counter and counter device (APP) at the consumer installation which functions to distribute and distribute electric power from the substation as a load center to customers on a regular basis. directly or through distribution substations (transformer substations) with adequate quality in accordance with applicable service standards.

C. Protection System

In general, a protection system has the meaning of a system that can secure equipment against disturbances, then localize the disturbed parts as small as possible, and limit their impact and influence on the system. . The protection system and components in the secondary distribution channel are shown in the image below.

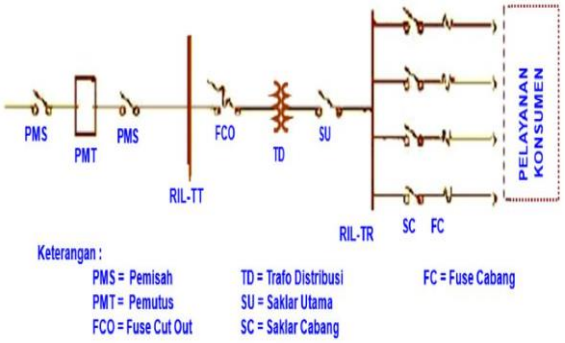

Figure 3. Arrester in distribution transformer

D. Protection Device

What is meant by the protection system device is a series of protective equipment between one component and another so as to form a security system that can function in accordance with the purpose of safety/protection. One of the protection devices against lightning disturbances such as arresters. Image arrester as in the image below.

Figure 4. Arrester in distribution transformer

E. Short Circuit Interruption

Short circuit faults that may occur in the electrical system network are: 1. Three-phase short-circuit fault 2. Two-phase short-circuit fault 3. Single-phase short-circuit fault to ground

F. Arrester installation in 20 kv . feeder

Arrester installation on feeder from 20 kv to transformer distribution like showed on image below . The use of arresters on position this that is if occur disturbance on 20 kv . network so disturbance made will be thrown away through arresters. So that transformer distribution will protected if occur disturbance voltage more as caused lightning .

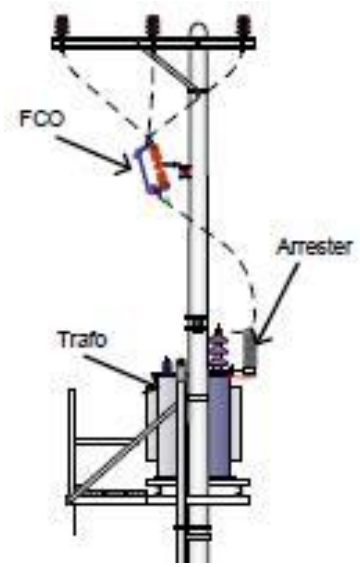

Figure 5. Arrester in distribution transformer

2. RESEARCH METHOD

Based on the study to be studied , the *flowchart* of this research is as shown in the following figure.

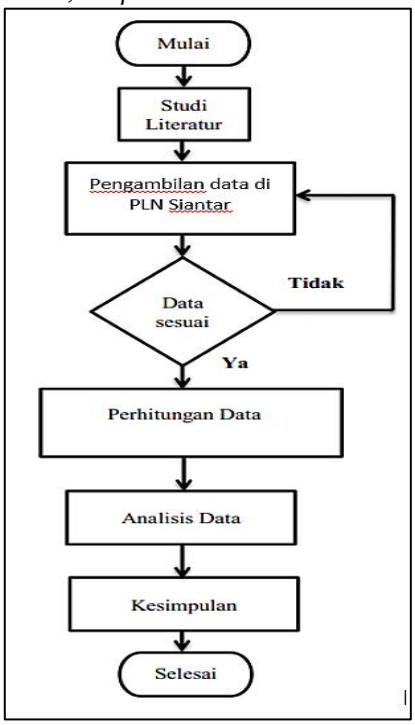

Figure 6. Research *flowchart*

3. RESULTS AND DISCUSSIONS

A. GFR Relay Settings

Ground Fault Relay (GFR) is something working relay _ based on existence connect short phase to land . Current settings on the relay GFR Current setting on the GFR relay can be set from 6% to with 12% of score current connect short 1 phase at the very end . Current setting value on the GFR relay is indicated in the following table .

Table 1. Current setting value on the GFR relay relay

Protection	I set primary	I set secondary
Outgoing	0.2 x In CT 0.2 x 700 A = 140 A	160 A / (800/5) = 1 A
Incoming	0.4 x In Transformer 0.4 x 1.602 A = 640 A	693 / (2000/5) = 1.73 A

B. OCR relay settings

Relay current more is working relay to current more , he will work when flowing current _ exceed setting value , both caused existence disturbance connect short or advantages burden for then give trip command to the appropriate PMT character the time . Current setting value on the GFR relay is indicated in the following table .

Table 1. Current setting value on OCR relay

Protection	I set primary	I set secondary
Outgoing	1.8 x 220 A = 396 A	396 A / (800/5) = 2.47 A
Incoming	1.2 x1.732 A= 2,078 A	2.78 / (2000/5) = 5.19 A

4. CONCLUSION

Study this discuss about Analysis protection system performance on network protection on 20 kv distribution system network at the substation parent PT PLN city Pematang Siantar . Results study this could concluded as following : During the relay setting process , with good so security to network interruption _ distribution could improved. Current setting value primary current and secondary on the GFR relay for outgoing side is 140 A and 1 A. Current setting value primary current and secondary on the OCR relay for the outgoing side is 396 A and 2.47 A.

ACKNOWLEDGEMENTS

Thank you to everyone who was involved in writing this article

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