e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:01/January-2023 Impact Factor- 6.752 www.irjmets.com

THREE PHASE TRANSMISSION LINE FAULT DETECTION AND ANALYSIS SYSTEM: A REVIEW

Geeta S. Metkar*1, D.R. Pisal*2, Prof. A.P. Kinge*3

*1Student, Masters In Engineering, Department Of Electrical Engineering, TSSM's Bhivarabai Sawant College Of Engineering And Research, Narhe, Pune, Maharashtra, India.

*2,3Professor, Department Of Electrical Engineering, TSSM's Bhivarabai Sawant College Of Engineering And Research, Narhe, Pune, Maharashtra, India.

DOI : https://www.doi.org/10.56726/IRJMETS32769

ABSTRACT

Power transmission is a major issue in electrical engineering after power generation. Fault in transmission line is common and main problem to deal with in this stream. The faults occurring in power systems can be broadly classified into open circuit faults and short circuit faults short circuit faults are more serve and common and can further classified into symmetrical faults and unsymmetrical faults. The study of these faults is necessary to ensure that reliability and stability of the power system.

Keywords: Three Phase Transmission Line Fault, Symmetrical Fault, Unsymmetrical Fault, Overhead Line Transmission Fault.

I. INTRODUCTION

The fault in the power system is defined as the defect or imperfection in the power system due to which the current is deflected from the intended path. The fault creates the abnormal condition which reduces the insulation strength between the conductors and disturbs the normal flow of the electric current. The reduction in insulation causes excessive damage to the system.

The faults in the power system may occur due to different factors like insulation failure of equipment caused by the number of natural disturbances like lightning, high-speed winds, earthquake, etc. it may also occur because of some accidents, like switching surges are coming in contact and also when foreign object came in contact with bare power lines, falling off a tree, vehicle colliding, with supporting structure, aero plane crashing, etc.

1. TYPES OF FOULTS

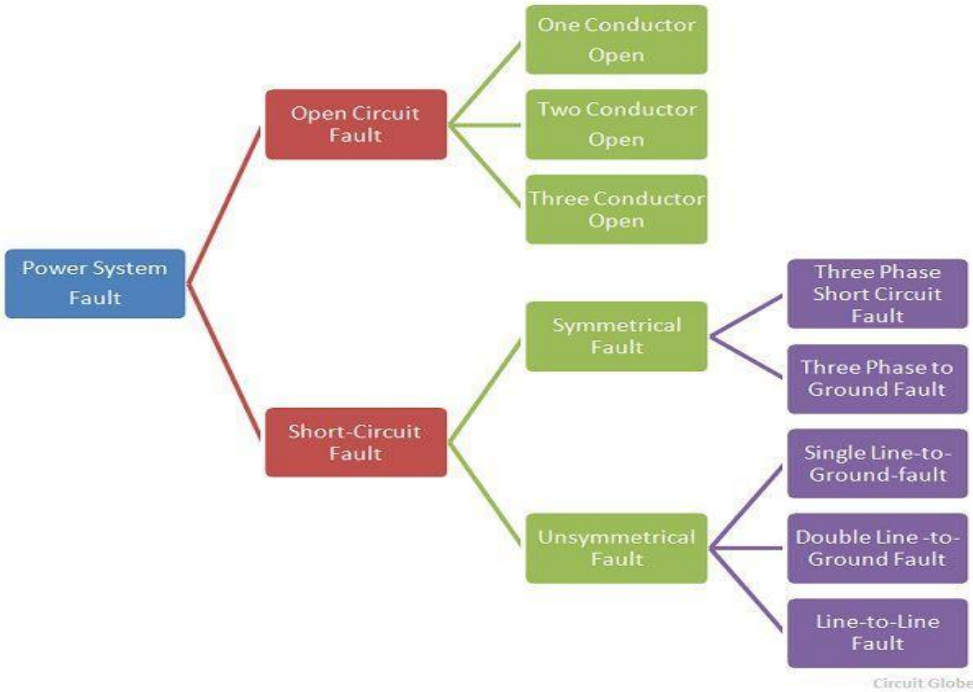


Fig. Types of Fault

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:01/January-2023 Impact Factor- 6.752 www.irjmets.com

2. WAYS OF DETECTING VARIOUS FAULTS

The proposed of monitoring system consists of Global Service Mobile (GSM) Modem, with PIC microcontroller and different sensor. It is installed at the 3 phase devices and the finding parameters recorded using the analog to digital converter (ADC) of the embedded system. The acquired parameters are processed and recorded in the system memory. If there is any abnormality or an emergency situation the system generate tripping signal and sends SMS (Short Message Service) messages to designated mobile telephones containing information about the abnormality.

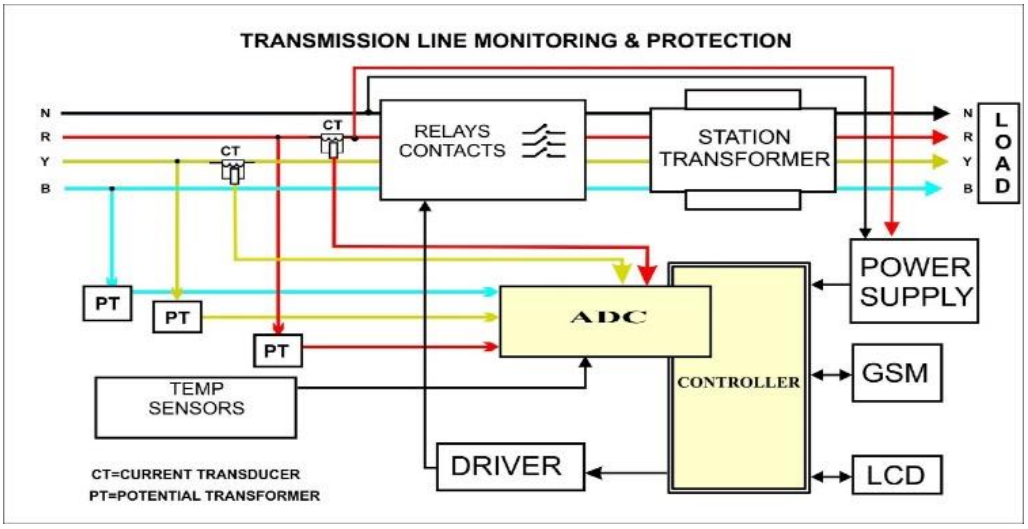
1) Measurement of Over-voltage: To measure overvoltage we used step down transformer in our project. The transformer connect across the phase and neutral of each phases (R, Y, B), which step down voltage from 300v AC (max) to 5 volt AC, further This voltage will be converted to DC by means of rectifier and give it to the input of ADC, the ADC will convert this signals in equivalent digital signals and give it to microcontroller. Further microcontroller compares these digital signals with the settled overvoltage (260v) and under voltage (180v) if the signals is greater than 260 volt and less than 180volt then the microcontroller trips the contactor. If in case of phase failure the microcontroller treat this fault as a under voltage because if any phase is not available that means the voltage is less than 180 v (0 volt is less than 180 volt) in this case also microcontroller trips the contactor.

2) Single Phasing: Single phasing can be prevented by using single phasing preventer. Single phasing preventer is an electronic circuit which prevents the three phase electronic operated electrical machines from single phase cut off, phase reversal and phase imbalance.

3) Temperature Monitoring: In order to make on-line monitoring possible, thermocouples are placed externally on the transformer and provide real-time data on the temperature at various locations on the transformer. High main tank temperatures have been known to indicate oil deterioration, insulation degradation and water formation.

4) Moisture: Online monitoring can be used to Improve the accuracy of Oil .Moisture sensors available can easily detect the presence of any moisture

3. BLOCK DIAGRAM



4. WORKING

The above block diagram represents the actual BLOCK diagram of the web based monitoring of substation transformer. It consists of various blocks such as microcontroller, measurement devices and sensor unit along with interfacing IC. The parameters for e.g. voltage, current, temperature, humidity by using microcontroller which is further connects with a PC or laptop this collected data will further send to server which will situated at any part of world through internet communication.

In further connection in case of fault such as unbalanced voltage, under voltage, overvoltage etc. the fault is being analyzed by microcontroller programming and the signal is being send to the driver relay to disconnect the contactor and isolate the substation.

As shown in the figure the power transformer is used to step down the voltage of 230V single phase to 12V. The 12V supply is being rectified to 12V by using the full wave rectifier. This rectified supply is regulated to 5V. This 5V of supply is need for the working of microcontroller, and the various equipped sensors. The P.T. and the current transducer are energized by the line conductors. The LCD used to display the monitored parameters on the station substation itself. The driver IC is used as a current booster to amplify the current from the microcontroller, used to drive the relay.

The microcontroller is being programmed to certain limits. The oil temperature, oil level and the humidity within the transformer. Whenever the fault occurs such as overvoltage, over current, under voltage, phase failure etc. the direct effect will be developed on the transformer. So in case of fault condition the microcontroller will give the command to driver IC, so that the relay is to be tripped and the transmission line will isolate.

II. CONCLUSION

The transmission line has a crucial function to maintain the reliability and to keep the quality of an electric power transmission system. On the other hand, the exposure to high voltage environment may also be able to cause risk to human health. Therefore an integrated monitoring system is necessary to be implemented for easy monitoring and controlling the substation while minimizing interaction of humans to the substation devices. All the substation devices conditions are displayed uninterruptedly in remote area or a monitoring place.

In short the easy parameter monitoring will allow reducing the man power requirement at the substation area. This parameter monitoring system will be done around the clock throughout the year. The overall efficiency of the substation will increase as its maintenance plan is reduced.

ACKNOWLEDGEMENTS

I would like to articulate my deep gratitude to my project guide Prof. D. R. Pisal who has always been my motivation for carrying out the project. His constant inspiration and effort made this project work a great success. I am thankful to him for contributions in completing this project work. An assemblage of this nature could never have been attempted without reference to and inspiration from the works of others whose details are mentioned in reference section. I am also thankful to Dr. S. G. Kanade, Professor, P.G. Co-ordinator Department of Electrical Engineering, Pune University, for their cooperation and encouragement I acknowledge my indebtedness to all of them. Last but not the least I would like to thank my parents and the Almighty.

III. REFERENCES

[1] W.L. Chan, L.L. Lai, "Internet Based Transmission Substation Monitoring'', IEEE Transactions on Power Systems, Vol. 14, No. 1, February 1999.

[2] Om Sharma, Prakash Mehala Detection and Classification of Transmission Line Faults 978-1-5386-5793-5/18/$31.00 ©2018 IEEE

[3] B. Qiu and H. B. Gooi, "Web-Based SCADA Display Systems (WSDS) for Access via Internet'', IEEE TRANSACTIONS ON POWER SYSTEMS, VOL. 15, NO. 2, MAY 2000.

[4] Sumit Dutta, Shreya Prakash, David Estrada Eric Pop, IEEE, "A Web Service and Interface for Remote Electronic Device Characterization'', IEEE TRANSACTIONS ON EDUCATION, VOL. 54, NO. 4, NOVEMBER 2011.

[5] 'A Course on Web Languages and Web-Based Applications', K. Sridharan, IEEE TRANSACTIONS ON EDUCATION, VOL. 47, NO. 2, MAY 2004

[6] www.google.co.in/images

[7] www.wikipedia.com

[8] www.fadooengineering.com

[9] V.K. MEHTA , (Power System) , chapter 25

[10] B.L. THERAJA & A.K. THERAJA, Volume 2, (AC &DC machines.