POWER QUALITY ANALYSIS OF DISTRIBUTED GENERATION SYSTEM

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Abstract: **Now a day's Micro grid is the necessary infrastructure of smart grid. However, variations and intermittance cause from unstable microsource and non-linear loads will execute considerable impacts on normal operation of the microgrid. In this project we have used combination of solar, wind energy for the sources of microgrid and analyze the power quality issues in this project by the power quality analyzer Fluke 435 series II.The wind energy generation, utilization and its grid penetration in electric grid are growing worldwide. The wind produced power is continuously changing due to its time varying nature and causing stability problems that's why we use the solar panel as the alternative source of energy along with the wind source. This project demonstrates the power quality problem due to installation of wind turbine and solar panel grid. Analysis results from the study can be used as a guideline for developing a real and independent microgrid power system with improved power quality conditions.**

Keywords: **Microgrid,Power quality analyser-fluke 435 series II.**

1.INTRODUCTION

Both electrical utilities and end users of power are getting progressively involved concerning the standard of electrical power. The term power quality has become one of the most important things in the power industry. The issue in electricity power sector delivery is not confined to only energy efficiency and environment but more importantly on quality and continuity of supply or power quality and supply quality. Electrical Power quality is that the degree of any deviation from the nominal values of the voltage magnitude and frequency. Power quality can also be defined because the degree to that each the employment and delivery of electrical power affects the performance of electrical instrumentality. From a client perspective, an influence quality drawback is outlined as any power drawback manifested in voltage, current, or frequency deviations that result in power failure or disoperation of customer of equipment. Power quality is definitely a serious concern within the gift era; it becomes particularly vital with the introduction of refined devices, whose performance is extremely sensitive to the standard of power supply.

This work describes the techniques of correcting the provision voltage sag and voltageswell in an exceedingly distributed system.At present, a large vary of terribly versatile controllers,which take advantage ofrecently out there power natural philosophy elements, ar rising forcustom power applications.

2. LITERATURE SURVEY

[1]Power quality analysis and characterization if different types of lamps used for domestic and industrial purpose Sandesh N. Bandgar1, Suraj D.Dadas2, Somnath G.Galave3 and Mr.Shrikant D.Mangate4 .

In this paper author focused on measurement of various power quality parameter such as total power consumption and total harmonic distortion and voltage, power factor ,harmonics.

[2]Power quality impacts in typical microgrid Asma Aziz1, KSV Swarna1,Alex Stojcevski2

Deakin University,Geelong Autralia

In this paper power quality impacts like power variations voltage variations THD and unbalance voltage level has been analysed of typical MG power system model.

[3]Microgrid modelling and simulations scenario design for power quality analysis Kexuan Tang,Chen Shen,Weidong Chen state key lab of power system department of electrical engineering Tsinghua university Beijing,china

This paper an EMT simulation model of multimicrogrid system is established in powerfactory software for power quality study.

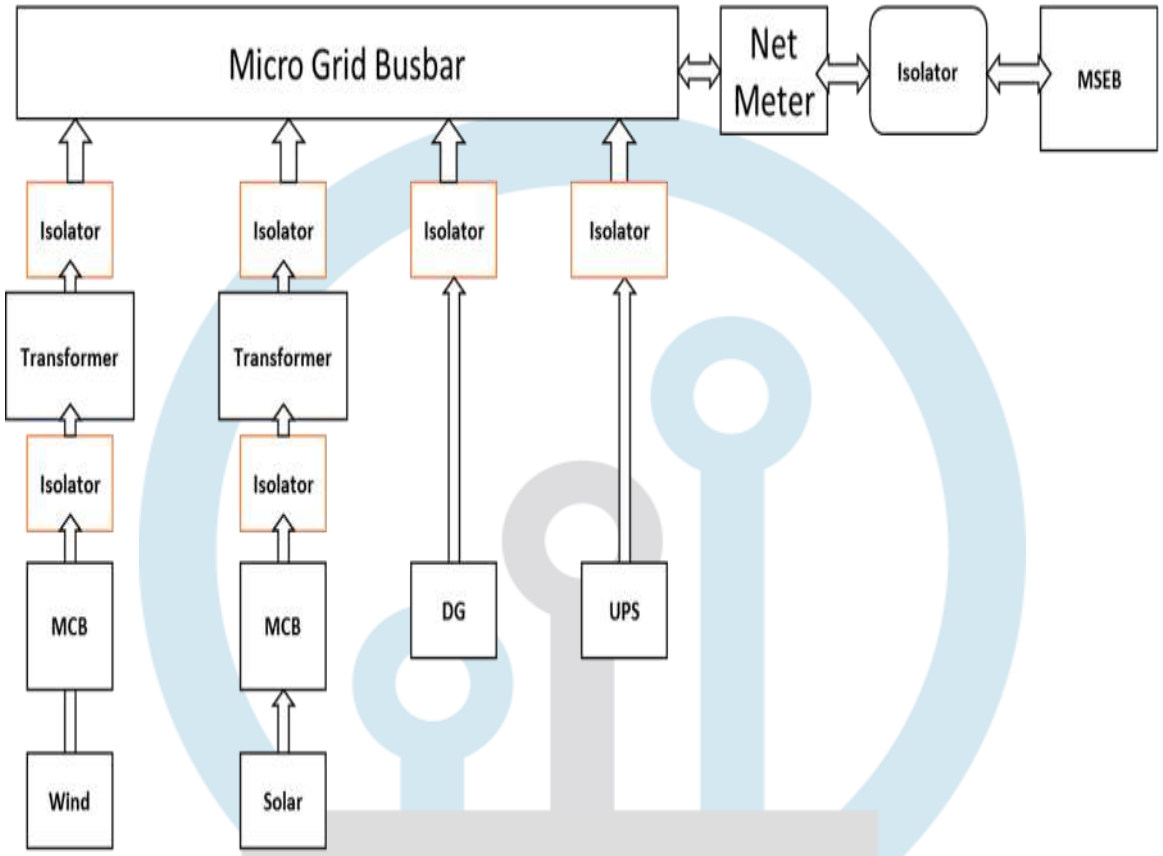
[4]Power Quality Analysis In Microgrid:an experimental approch Arangarajan Vinayagam1*, KSV Swarna1, Sui Yang Khoo1, Alex Stojcevski2

In this paper author explains different methods of microgrid.this paper gives brief knowledge about modification in microgrid system

[5] Application Of Combined System To Enhanced Power Quality In An Island Microgrid Ma Zhengbo,Li Linchuan and Dong Tue, Key laboratory of power system simulation and control of ministry of education Tianjin university, Tianjin 3000072,China.

This paper proposes a combined system constructed by shun6t active power filter and SVC to improve power quality of Island microgrid.

3.BLOCK DIAGRAM



Block Diagram of Microgrid system

4.POWER QUALITY ANALYSER Fluke 435 series II:

Figure No.1.1: Fluke 435 series II

5.KEY FEATURES OF FLUKE 435 SERIES II:

Fluke 435 series II products are design for users who need to get to the solution of the power quality problem as quickly as possible. So that they can minimize expensive down time. The measurement process and display of data is optimizing to get the most important information as quickly as possible.

Multiple parameters square {measure} measure at the same time and displayed in formats that quickly describe overall power quality health whereas supplying you with the careful data you would like to form higher maintance selections.

Data are often quickly accessed as straightforward digital worth ,trend graphs that give you fast insight into changes over time , waveforms, phasor diagrams or analyze and organize into

tabular formats like event information wherever the magnitude,duration and time stamping modify fast correlation to the issues you're experiencing in your facility.

6.TERMS AND DEFINATIONS:

1) Power Quality: There are often fully completely different definitions for power quality, counting on neutral.

For example,

a) In concern to utility Power quality define as reliability and show statistics demonstrating that its system is99.98 percent reliable.

b) Manufacturer of load equipment define power quality as those characteristics of the power supply that enable the equipment to work properly. These characteristics can be different for different applications.

c) Ultimately power quality is a consumer-driven issue and the end user's point of reference takes precedence.

2)Importance of Power Quality

a) Newer-generation load equipment, with microprocessor-based controls and power

b) electronic devices, is more sensitive to power quality variations than was equipment

c) Used in the past.

d) The increasing stress on overall grid potency has resulted in continuing growth within the application of devices like high-efficiency, adjustable-speed motor drives and shunt capacitors for power factor correction to reduce losses.

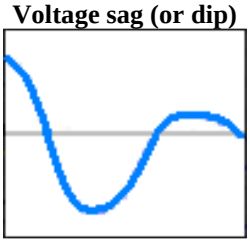
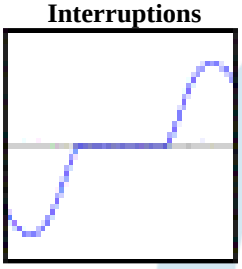
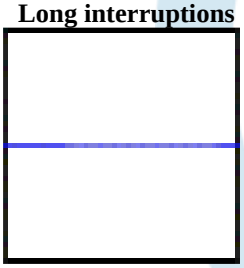
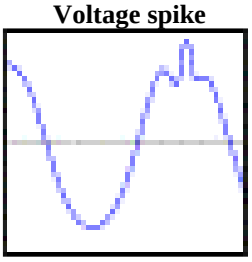
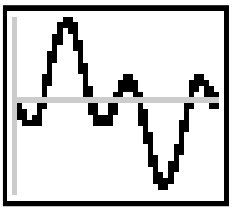
e) This is resulting in increasing harmonic levels on power systems and has many people concerned about the future impact on system capabilities.

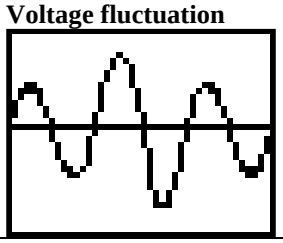
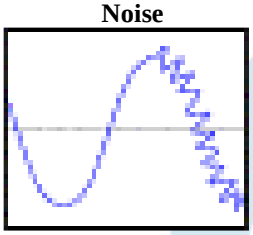
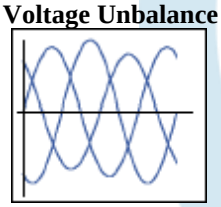
f) End users have an increased awareness of power quality issues.

g) Utility customers are getting higher au fait concerning such problems as interruptions, sags, and switching transients and are challenging the utilities to improve the quality of power delivered.

h) Many things are now interconnected in a network. Integrated processes mean that the failure of any element has way more necessary consequences.

7.POWER QUALITY ISSUES :

1.	**Voltage sag (or dip)** 	**Description:** A decrease of the normal voltage level between 10 and 90% of the nominal rms voltage at thepower frequency, for durations of 0,5 cycle to 1 minute. **Causes:** Faults on the transmission or distribution network. Faults inConsumer's installation. Connection of heavy loads and start-up of large motors. **Consequences:** Malfunction of information technology equipment, namely microprocessor-based controlsystems (PCs, PLCs, etc) that may lead to a process stoppage. Tripping of contactors andelectromechanical relays. Disconnection and loss of efficiency in electric rotating machines.
2.	**Very short Interruptions** 	**Description**: Total interruption of electrical supply for duration from few milliseconds to one or two seconds. **Causes**: Mainly due to the opening and automatic enclosure of protection devices to decommission a faulty sectionof the network. The main fault causes are insulation failure, lightning and insulator flashover. **Consequences**: Tripping of protection devices, loss of information and malfunction of data processing equipment.Stoppage of sensitive equipment, such as ASDs, PCs, PLCs, if they're not prepared to deal with this situation.
3	**Long interruptions** 	**Description:** Total interruption of electrical supply for duration greater than 1 to 2 seconds **Causes:** Equipment failure in the power system network, storms &objects (trees, cars, etc) striking lines orpoles, fire, human error, bad coordination or failure of protection devices. **Consequences:** Stoppage of all equipment.
4.	**Voltage spike** 	**Description:** Very fast variation of the voltage value for durations from a several microseconds to few Milliseconds. These variations may reach thousands of volts, even in low voltage. **Causes:** Lightning, switching of lines or power factor correction capacitors, disconnection of heavy loads. **Consequences:** Destruction of components (particularly electronic components) and of insulation materials,data processing errors or data loss, electromagnetic interference.
5.	**Voltage swell**	**Description:** Momentary increase of the voltage, at the power frequency, outside the normal tolerances, with duration of more than one cycle and typically less than a few seconds. **Causes:** Start/stop of heavy loads, badly dimensioned power sources, badly regulated transformers (mainly during off-peak hours). **Consequences:** Data loss, flickering of lighting and screens, stoppage or damage of sensitive equipment, if thevoltage values are too high.
6.	**Harmonic distortion** 	**Description:** Voltage or current waveforms assume non-sinusoidal shape. The waveform corresponds to thesum of different sine-waves with different magnitude and phase, having frequencies that are multiples ofpower-system frequency. **Causes:** *Classic sources*: electric machines working above the knee of the magnetization curve (magneticsaturation), arc furnaces, welding machines, rectifiers, and DC brush motors. *Modern sources*: all non-linearloads, such as power electronics equipment including

		ASDs, switched mode power supplies, data processing equipment, high efficiency lighting. **Consequences:** Increased probability in occurrence of resonance, neutral overload in 3-phase systems,overheating of all cables and equipment, loss of efficiency in electric machines, electromagnetic interferencewith communication systems, errors in measures when using average reading meters, nuisance tripping ofthermal protections.
7.	**Voltage fluctuation** 	**Description:** Oscillation of voltage value, amplitudemodulated by a signal with frequency of 0 to 30 Hz. **Causes:** Arc furnaces, frequent start/stop of electricmotors (for instance elevators), oscillating loads. **Consequences:** Most consequences are common to undervoltages. The most perceptible consequence is theflickering of lighting and screens, giving the impression of unsteadiness of visual perception.
8.	**Noise** 	**Description:** Superimposing of high frequency signals on the waveform of the power-system frequency. **Causes:** Electromagnetic interferences provoked by Hertzian waves such as microwaves, television diffusion,and radiation due to welding machines, arc furnaces, and electronic equipment. Improper grounding may alsobe a cause. **Consequences:** Disturbances on sensitive electronic equipment, usually not destructive. May cause data loss and data processing errors.
9.	**Voltage Unbalance** 	**Description:** A voltage variation in a very 3-phase system within which the three voltage magnitudes or the phaseangle differences between them are not equal. **Causes:** massive single-phase hundreds (induction furnaces, traction loads), incorrect distribution of all single-phase loads by the three phases of the system (this may be also due to a fault). **Consequences:** Unbalanced systems imply the existence of a negative sequence that's harmful to all or any threephase loads. the foremost affected hundreds ar three-phase induction machines

8.FUTURE SCOPE:

For economic operation of power system the level of power quality should be properly maintained.
PQ is vast concept concerning optimization.
Hence power quality provides good platform to deal with all these problems.

9.ACKNOWLEDGEMENT:

We are very grateful to **Prof. S. M.Mukane**, the Principal SVPM's College of Engineering, Malegaon (Bk) for their best regards behind us for this project.

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10.CONCLUSION :

Now a days the power quality is the big issues in all sector. Customer is expected quality power. Hence due to poor power quality, continuous losses and abnormal conditions occurs. Therefore the prime duty is to maintain power quality by everyone. Hence the analysis of the power quality issues of the load connected to distributed generation system is done.(i.e. analysis of voltage sag,voltage swell,hormonics)

REFERENCES:

[1]Power quality analysis and characterisation if different types of lamps used for domestic and industrial purpose. Sandesh N. Bandgar1, Suraj D.Dadas2, Somnath G.Galave3 and Mr.Shrikant D.Mangate4

[2]Power quality impacts in typical microgrid.Asma Aziz1,KSV Swarna1,Alex Stojcevski2,Deakin University,Geelong Autralia

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[4]Power Quality Analysis In Microgrid:an experimental approach. Arangarajan Vinayagam1, KSV Swarna1, Sui Yang Khoo1, Alex Stojcevski2

[5] Application Of Combined System To Enhanced Power Quality In An Island Microgrid. Ma Zhengbo,Li Linchuan and Dong Tue, Key laboratory of power system simulation and control of ministry of education Tianjin university, Tianjin 3000072,China.