International Journal of Advanced Technology in Engineering and Science www.ijates.com
Volume No.02, Issue No. 12, December 2014 ISSN (online): 2348 – 7550

DESIGN AND CONTROL OF AN ADVANCED METHOD OF CONTROL FOR THREE PHASE POWER CONVERTER IN DISTRIBUTION SYSTEM

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ABSTRACT

This paper deals with the power quality improvement in the distribution system by using the UPQC. In this paper we are proposed a unique control strategy for the three phase inverter in a distribution system; it has the capability to control both cases like islanded mode and the grid tied operations without requirement of the switching arrangement between the operating controllers and the critical islanding mode identification techniques. In this hysteresis control strategy is implemented for three phase inverter in the distribution networks. This control strategy operated to regulate load variations presence in the islanding conditions and also current regulation in case of harmonics in the grid tied operations. Additionally it can control the grid side and the islanding operations with the presence of nonlinear load variations in the traditional control strategy. Furthermore this unified control strategy can regulate the current variations in the grid tied operation and the parameter proper designing analysis is proposed.

Index Terms: Three Phase Inverter, A Unified Control, Distributed Generation, Load Current Compensation, Islanding and Hysteresis Control Strategy.

I. INTRODUCTION

DISTRIBUTED generation (DG) is promising as a practical alternative when non-conventional or renewable energy major sources are accessible, such as, wind turbines photovoltaic arrays, micro turbines, fuel cells. The majority of these sources are associated to the effectiveness throughout the power electronic connecting converters i.e., three-phase inverter. Additionally, DG is a appropriate form to suggest high consistent electrical power supply generation, as it is able to activate moreover in the grid-tied approach or in the islanded method. In the grid-tied operation process, DG transfers power to the usefulness and the local dangerous load. Based Upon the incident of effectiveness of created outage, the islanding is produced. Under this circumstance, the DG must be tripped and cease to strengthen the segment of effectiveness as quickly as possible. Conversely, in order to get better the power consistency of a little local dangerous load, the DG ought to cut off to the used and continue to feed the local critical load. The load voltage is important issue of these two operation modes of procedure, since it is permanent by the utility in the grid-tied process of operation, and produced by the DG in the islanded operation, correspondingly. Consequently, upon the occurrence of islanding, DG must be required to take over the required load voltage as soon as probable, in order to diminish the transients in the load voltage. And this problem creates a goal for the process of DG. Droop-based regulation is utilized extensively for the

power distribution of parallel connected inverters which is treated as voltage mode control in this dissertation, and it can also be employed to DG to understand the power distribution between DG and convenience in the grid-tied operation mode. In these circumstances, the inverter is always synchronized as a electrical energy source loss by the voltage loop, and the excellence of the produced load voltage can be definite during the conversion of working modes of operation. Nevertheless, the constraint of this technique is that the dynamic presentation is poor, since the bandwidth of the peripheral power loop, controlling droop control, is much lesser than the generated voltage loop. Furthermore, the grid current is not regulated directly, and the problem of the critical internal grid current throughout the conversion from the building mode to the grid-tied operation always included, however we have to select the phase-locked loop (PLL) method and the virtual inductance are preferred. The hybrid voltage controlled and current controlled mode of strategies can regulation is a accepted substitute for DG, in which two separate sets of controllers are engaged. The inverter is modulated as a current source by one sets of a compensator in the grid-tied operation, although as a voltage source converter by the other operating controller in the presented islanded mode. As the voltage loop or current loop is just functioned in this process, a nice dynamic quality can be performed. In addition, the developed output current is straight forward controlled in the grid-tied operation process and the critical grid current is approximately compensated.

In the hybrid different controls, there is a necessitate to control the controller when the function mode of DG is distorted. Throughout the period from the occurrence of utility outage and sampling the controller to under voltage mode, the produced load voltage is neither unchanging by the convenience, nor synchronized by the DG, and the length of the time intermission is strong-minded by the islanding recognition process. Therefore, the most important question in this move toward is that it gives the performance of the load voltage greatly dependent on the speed and accurateness of the islanding recognition technique. Another problem connected with the abovementioned process is the waveform effectiveness of the grid current and the developed load voltage based on the nonlinear local load. In the grid-tied operation process, the production current of DG is usually preferred to be pure sinusoidal. When the nonlinear local load is connected, the harmonic content of the load current will completely stream into the helpfulness. A single-phase DG, which injects additional voltage harmonic current addicted to the usefulness for extenuating the harmonic constituent of the grid current, is accessible. The voltage mode organize is better by regulating the DG to imitate a resistance at the rippled frequency, and then the rippled current permitting into utility can be reduced. In the islanded state of action the nonlinear load may disfigure the load voltage, and many organize technologies have been implemented to get better the excellence of the developed voltage, including a multi loop control method, resonant controllers , sliding mode strategy. But, obtainable control strategies, commerce with the nonlinear local performed load in DG, mostly centered on either the superiority of the grid existing in the grid-tied method or the one of the generated load voltage in the islanded mode process, and civilizing equally of them by a combined control technique is prepared. This paper implemented a unified control technique that avoids the abovementioned control technologies. First, the conformist inductor current loop is working to control the three-phase inverter in DG to continue as a current source with a specified location in the synchronous reference frame (SRF). Subsequent, a novel voltage controller is accessible to supply required reference for the inner inductor current arrangement technique, where a directed-plus-integral (PI) controller and a proportional (P) controller are applied in *D*-axis and *Q*-axis, correspondingly. In the grid-tied process, the load voltage is conquered by the usefulness, and the voltage controller in *D*-axis is drenched, although the produced output of the voltage controller in *Q*-axis is obligatory to be zero point by the Phase Locked Lop. Consequently, the implication of the

inner current loop technique cannot synchronized by the voltage loop, and the DG is prohibited as a current establishment just through the inner current loop arrangement. Upon the incidence of the grid output voltage, the load voltage is no additional resolute by the usefulness, and the voltage controller is mechanically functioned to control the produced voltage. These occurred logically, and, thus the developed control algorithm does not require a compulsory sampling between two different sets of compensators. Additional, there is no requirement to notice the islanding quickly and precisely, and the islanding uncovering technique is no more dangerous in this come close to desired output. Furthermore, the designed control method, offering from just including the current and voltage response control, releases a better dynamic presentation, checked to the voltage approach control. Third, the developed control method is improved by proposing a unified load current compensation methodology, in order to agreement with the question caused by the nonlinear operation, and this system is proposed with addition the load current addicted to the orientation of the inner current loop arrangement. In the grid-tied mode strategy, the DG injects additional required harmonic current into the network for connecting the harmonic content of the consumer grid tied current, and hence, the harmonic content reachable of the grid current will be compensated. Furthermore, the advantage of the designed load current feed advance can be comprehensive into the islanded action manner, due to the better superiority of the desired load voltage.

II. EXISTED SYSTEM

In the existed system the island detection technique is implemented with the measurement of PCC by direct and quadrature axis is designed in the distribution system arrangements. The major reason to develop this strategy based on the voltage variations in the PCC. The active powered voltage is get back through the implemented this strategy in this the error between the distribution generator and the mismatched voltage to the mismatched voltage between the load power voltage when the grid voltage is in off condition to the distributed load only. When the grid is switched off condition there is sudden variations are produced in the PCC voltage. The voltage across the dc –link capacitor is calculated by the actual difference between the per unit normal conservative voltage to the measured voltage of the $V_{means}^{p.u}$ voltage and the operating predetermined value. Power supply specifications are very dissimilar to the voltage supply minimum operated voltages 10% reduces than the desired voltage then there is efficiency of the converter is decreased. The measured voltage is maintained voltage like as (0.8-0.9 p.u) of the desired level of the voltage under switching period. The difference in the voltages is compensated by the active power compensation values are calculated from the second order orientation values. The locus diagram is deliberate and drawned in the below mentioned figure.1, to avoid the fault in between the measured voltage and load side voltage when the grid is switched off condition. At the time of grid is triggered off mode the detection of mismatch voltage identification is very difficult to estimate due to this strategy is implemented to find that error and that is compensated by the degree of arrangements in the locus diagram based reference values.

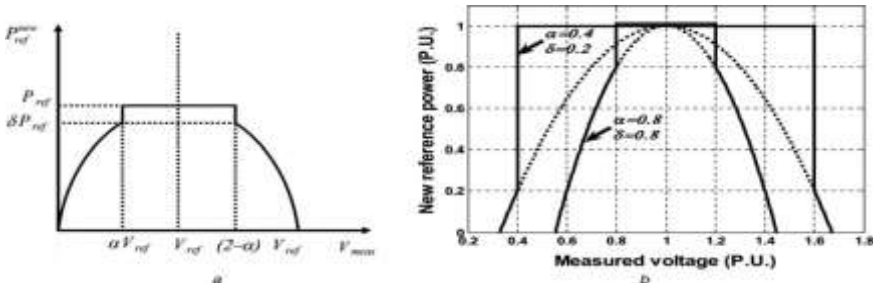

Fig1.Second Order Locus Diagram

The existed unified control strategy is implemented in the below mentioned figure.2. In this major block parameters like as three phase inverter and the passive components designs are explained.

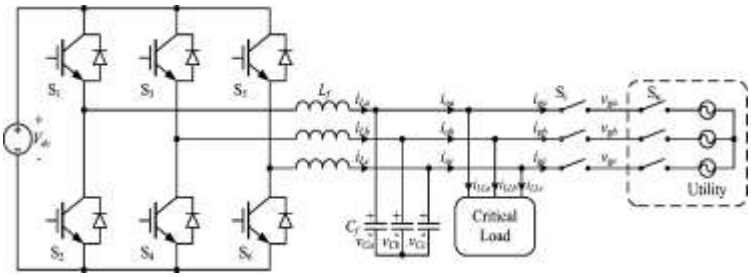

Fig.2. Block Diagram of Designed Model in Distribution System

III. PROPOSED SYSTEM

In this we are proposed unified control strategy technique with the hysteresis control method. In the distribution systems the power quality of the system is decreased continuously to enhance the power quality y implementing the hysteresis control strategy is proposed. The hysteresis loop control is implemented like as a closed loop arrangement is illustrated in the below mentioned figure 3. In this we are using the error signal e (t) which is difference between the desired current Iref (t) and the additional injected current from the inverter Iactual (t).whenever that the generated error goes to the higher values on that time the forced to decrease the current oft the inverter, if the error is reaches to the lower values the inverter current goes higher position. The block diagram the error signal range specifies that the controlling values of emax – emin, they can manage the rippled content occurrence in the output from the inverter is known is hysteresis control. These limits are controlled generated from the reference signals; these are control the current assortment whenever the reference values are varying conditions also on that time current forced to sustain under our controlling limits. These limits are acts as the upper and lower limits of the band controller.

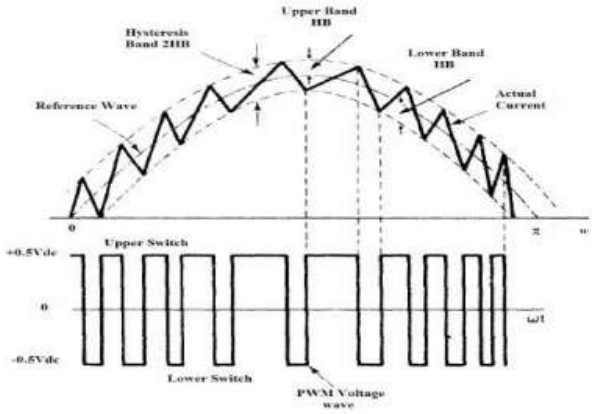

Figure.3 Hysteresis Controller Basic Topology

These are generated the pulses like S1, S2, S3, S4, S5 and S6, these are given too the controlling for the inverter. Finally it can maintain the required level of voltage corresponding to the user requirements. The generated pulses are given to the inverter the he inverter is functioned with these firing pulses will work effective manner.

IV. CONCLUSION

The paper proposed a unique control strategy for the three phase inverter in distribution systems. In this performs two modes of operations grid-tied operation and the islanding operation these are facing the problems

like load variations in the islanding and the current distortions in the grid side these are compensated by providing the hysteresis control strategy without placing the switching elements in between the operating controllers. The three phase combined controllers has the competence to operate the two at a time grid tied operations and the islanding modes of the operation by using the hysteresis loop control strategy. In grid-tied operation the variations in the currents generated the harmonic contents very high this is also compensated by the hysteresis loop control strategy in order to improve the performance of the proposed inverter. The Simulink model s tested and verified in the MATLAB/SIMULINK software these are explained the paper in the paper. Finally the proposed three inverter enhanced performance in distribution system with hysteresis loop control strategy.

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