

Dynamic Voltage Restorer

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Abstract: Today's life deals with various energy uses, if there is no electrical energy we can't survive in life. World and our country India face the problem with electrical energy distortion losses in power system. Power quality is a very important issue. Its impact on electricity suppliers equipment, manufacturer and customer. "Power quality is define as any problem manifested in voltage, current and frequency that can be result in failure or damage of customer equipment." It refers to a wide variety of electromagnetic phenomena that characterize the voltage and current at given time and at a given location in power system. Sensitive loads such as computers, programmable logic controllers (PLC), variable speed drive (VSD) etc are effected by the power quality problems. To solve this problems, the DVR is modern and important power device, for compensation voltage sag. In power distribution system, the Dynamic Voltage Restorer (DVR) is fast, flexible and efficient solution to voltage sag problem. The DVR is series connected device to mitigate voltage sag and to restore load voltage to its rated value. In this paper we have decide to design "Dynamic Voltage Restorer".

Keywords: DVR, VSD.

Introduction

As we know the problem of voltage sags and its severe impact on sensitive loads is well known, to solve this problem, the DVR is a modern custom and important power device. For compensation voltage sags in power distribution systems DVR is use. The Dynamic Voltage Restorer (DVR) is fast, flexible and efficient solution to voltage sag problem. The DVR is a series compensator, used to mitigate voltage sags. In today's life we have to save the energy with using energy efficient devices. To save the energy we have to think on also power quality. DVR is best example for the improving power quality of the supply system.

• SAG

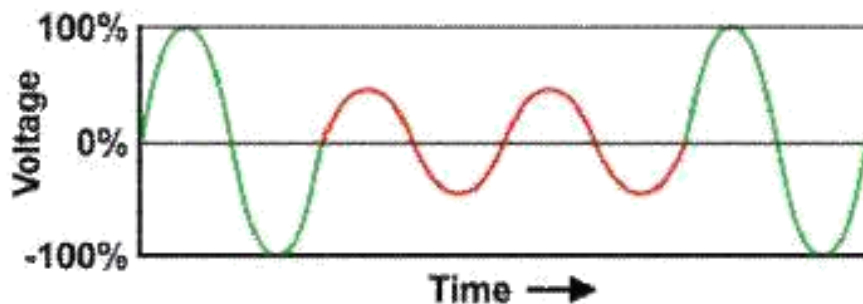
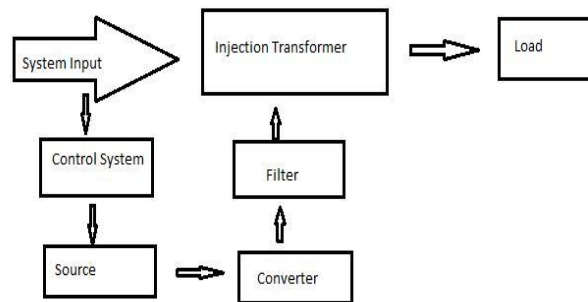


Fig no1:- Voltage Sag waveform

Above figure no 1 shows the voltage sag waveform in the system. The voltage sag is define as the "Sag is nothing but decrease in the RMS value of the voltage from 0.1PU to 0.9PU for time period 0.5 cycle to 1 minute". The measurement of the voltage sag is stated as percentage of the normal voltage. If the system having voltage sag of the 30% is equal to the 30% of the normal voltage.

Block Diagram



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Fig no 2 Block diagram of the Dynamic Voltage Restorer

Injection Transformer

The name suggest the working of the injection transformer. The purpose of injection transformer is to inject the voltage in the system when sag is introduce in the system. The injection transformer is main part of the DVR .This transformer is connected in series with the system, to inject the series voltage in the system. This transformer is work as the isolation transformer to protect the system from the load side.

Filter

In this device we are using converter to convert DC source supply to the AC supply. While converting the DC to AC some harmonics are introduce in the system, so to reduce the harmonics we are using the filter to introduce pure AC supply from the impure AC. Filter is connected in parallel to voltage source converter and transformer.

Source

In the DVR Source is use as a storage unit for the system. DC source is use to take require energy for injecting the same. Source use in the DVR is the DC source. DC source is connect to the voltage source converter. It will supply the real power in the system threwh the VSC.

Voltage Source Converter (VSC)

A voltage source converter is a power electronic system consisting of switching devices like: Metal oxide semiconductor field effect transistor(MOSFET),Gate turn of Thyristors(GTO),Insulated gate bipolar transistors (IGBT) and Integrated gate commutated thyrisors(IGCT).Which can generate asinusoidal voltage at any required frequency ,magnitude and phase angle. The output voltage does not need to be of a single frequency. Voltage source converters are widely used in variable speed drive (VSD),but can also be used to mitigate voltage dips. The VSC is used to either completely replace the supply voltage or to inject the missing voltage.The missing voltage is the diference between the nominal voltage and the actual one. Voltage source converter is use as a inverter.

Advantages

- DVR is simple in design.
- DVR having fast operation than other FACT devices.
- DVR can mitigate the sag in voltage causes by any fault.

Conclusion

Best way to protect our devices from the sag is to use of Dynamic Voltage Restorer. From this Dynamic Voltage Restorer we can protect the devices from system interruptions. The design of the Dynamic Voltage Restorer is simple than other sag controllers. We can control the input signal from the system to the devices. Now a days we can use many electronic devices this devices create disturbance in the system, so to protect our devices from those disturbances we have to control the sag in the system. Dynamic Voltage Restorer we can use for this controlling purpose. We have to use these FACT devices to protect the sensitive devices in the system.

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