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Implement of A High Current Three Phase Double Star Rectifier

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Abstract

In this paper a double star rectifier with interphase connection that know as ANSI 45 has been studied. To achieve high direct current, rectifiers will be paralleled, which it know as multi-phase rectifiers. Harmonics transferred to the grid are reduced by multi-phase rectifiers. Double star rectifiers are used for low voltage and high direct current in the industry applications. Also, to overcome the saturation state of the transformer, a reactor is used at the common point of the star. In this rectifier, the output injected current will be controlled. MATLAB/Simulink software is used to simulate this rectifier. Then a 6 kA, 180 kW double star rectifier is designed and made.

Key words: double star rectifier, ANSI 45, high direct current

1. Introduction (Times New Roman 14pt in Bold)

According to daily increase of dc loads, various papers have examined dc sources for power quality, harmonic, reactive power injection and etc. [3]. High power converters are used in electro-refining processes of metals, DC arc furnaces, DC welding and etc. [4].

The ac/dc converters can be divided into different ways. A method is based on the active or passive elements, diode or thyristor, in the structure of the rectifiers. Uncontrolled rectifiers are based on diode and controlled rectifiers are based on thyristor and Half Controlled rectifiers are based on the combination of diode and thyristor [7]. In [11] papers, another category have been classified base on the direction of power transfer.

Three phase rectifiers can be divided into two general categories of full wave and bridge. Each of these rectifiers has different applications and features as shown in table 1 [1]. The minimum voltage drop due to source impedance, leakage reactance and the devices of the current path are needed by the low voltage and high current application. The full wave method is very suitable for high current applications due to the presence of only one element in the current path [1].